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ASIATIC SOCIETY OF BENGAL.

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# PROCEEDINGS

## OF THE

# ASIATIC SOCIETY OF BENGAL,

## FOR JANUARY, 1880.

The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 7th instant, at 9 o'clock P. M.

H. B. MEDLICOTT, Esq., M. A., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed:—

The following presentations made since last meeting were laid on the Table—

1. From the Government of India, Home, Revenue and Agricultural Department,—Scientific Results of the Second Yarkand Mission; (1) *Syringospherida*, by Professor P. M. Duncan, and (2) *Lepidoptera*, by F. Moore.

2. From the Author,—Note on Elephants (supplementary to that of the 8rd April 1879); by Captain H. W. Clarke.

3. From the Cherbourg Society of Natural Science,—Catalogue of their Library, Part II; by Aug. le Jolis.

4. From the Zoological Society of London,—List of the Vertebrate Animals now or lately living in the Gardens of the Zoological Society of London. Seventh Edition.

5. From the Author,—Metrical Translations from Sanskrit Writers; by J. Muir.

6. From the Superintendent, Marine Surveys,—(1) Chart of the Mutlah River to the Chittagong Coast, (2) Chart of Tuticorin Roadstead and Harbour.

7. From Die Verein für Naturkunde in Cassel,—Catalogue of their Library.

8. From Dr. G. Leitner,—Proceedings of the Anjuman-i-Punjab in connexion with the proposed Vaccination Bill and Dr. Cunningham's Sanitary Primer.

9. From the Royal Zoological Society of Amsterdam,—A number of their publications, the names of which will be found in the Library List.

10. From the Madras Government, Education Department,—A Classified Index to the Sanskrit MSS. in the Palace at Tanjore; by A. C. Burnell.

11. From the Königl. bayerische Akademie der Wissenschaften in München,—Ueber Calderons Sibylle des Orients; by W. Meyer.

The following gentlemen, duly proposed and seconded at the last Meeting, were ballotted for and elected Ordinary Members—

Fred. E. Pargiter, Esq., B. A., C. S.

Lieut. W. H. Johnstone, R. E.

Bábu Govinda Kūmāra Chaudhuri (re-election).

H. Kisch, Esq., C. S.

J. W. Parry, Esq.

The following Gentlemen were announced as candidates for ballot at the next meeting—

1. Beharilal Gupta, Esq., B. C. S., proposed by Dr. Rájendralála Mitra, seconded by Bábu P. C. Ghosha.

2. The Hon'ble Arthur Wilson, proposed by H. B. Medlicott, Esq., seconded by J. Crawford, Esq.

The SECRETARY reported that Mr. R. Parry had intimated his desire to withdraw from the Society.

The SECRETARY announced that a limited number of coloured copies of Messrs. Moore and Hewitson's "Descriptions of new Indian Lepidoptera in the collection of the late Mr. W. S. Atkinson" were available for sale to Members at Rs. 4-8 per copy and to Non-Subscribers at Rs. 6 per copy.

With reference to the Ethnological Queries put by Professor Schaffhausen of Bonn to Mr. H. Rivett-Carnac, and which were published in the August Proceedings, the Secretary read a letter from Mr. W. King, dated 9th December, in which he says:

I have just seen in the Proceedings, Asiatic Society of Bengal for August 1879, the series of questions put to Mr. H. Rivett-Carnac by Professor Schaffhausen of Bonn.

Perhaps it may not be too late to let it be known that I saw two Yanádi men (of an aboriginal tribe living about Sriharikota and the Palicah Lake) produce fire from the friction of wood in (I think) 1862. It was a rainy day, and within a short distance of a village whence fire could easily have been found: yet these men worked industriously for

about half an hour until the fire was produced. The man sat on his haunches, with a small horizontal bar of wood, kept in its place underneath his feet. There was a small hole made or worn in this bar, and in this was inserted the point of a vertical stick which the men alternately rolled between the palms of their hands. Under this rapid friction of the vertical stick in the small hole in the horizontal one carbonized dust gradually collected, when at last a first spark of fire was produced which the men gently blew into a flame around a piece of rag which they held close to the bit of carbonized dust. I neglected to ascertain the kinds of wood used; but the men had evidently had them for some time in their possession.

The PRESIDENT exhibited some Geological Specimens from Afghanistan and said—

At the June and August meetings of the Society specimens were exhibited from the hills between Dera Gházi Khán and the Pishin Valley, on the Thal Chotiáli route, passing north of Quetta. The presence of Mtumén and nummulitic rocks was proved; and there were no specimens that might not belong to these formations. There were also many samples of baser irruptive rocks, and some partially metamorphosed rocks, but which may only be connected with the contact of the trappean masses.

The collections now to be noticed are from the region of the Safed Koh. There are 12 specimens sent by Major Tanner from the north or Gandamak side of the range, and three by Mr. Scott from the same ground, one being from the summit of Sikarún the highest peak (15,620 feet) of the range. Both of these contributors are officers of the Topographical Survey. A larger collection, numbering some 40 specimens, was made by Dr. J. E. Tierney Aicheson, attached as botanist to the Kuram column; these are from the southern or Peiwar Kotal flanks of Sikarún. The two latter collections were communicated through Mr. A. B. Wynne, of the Geological Survey.

From all these specimens we soon form a rough idea of the geology of the ground. The ridge of the Safed Koh at Sikarún, and all the country to the north seems to be formed of much altered rocks, though with only few samples of the extreme gneissic type. There is a remarkable preponderance (as represented by these specimens) of magnesian and calcareous rocks; amongst them come very fine white montitis and stratitis. The culminating point of the Safed Koh is approximately formed of pure white quartzite, but the range most likely owes its name to its snow beds. The white rock from which Safed Sang takes its name is a beautiful statuary marble.

On the western flanks of Sikarām, at elevations of 10,000 feet, quite unaltered shales, with impressions of Algæ, and similar rocks from the south side, occur among Dr. Aicheson's specimens. There are no observations to suggest what may be the stratigraphical solutions of these highly contracting series of rocks. The only clue as to age for any of these formations is in a large pebble of limestone found in the Shalinar stream on the east side of the Peiwar Kotal; it is a lithodendroid coral, testifying to the presence of triassic or carboniferous strata in the vicinity.

A serpentinous trappean rock or diallagic serpentine seems to be in force about Ali Khel.

Beside these, Dr. Aicheson brought to notice a copper ore found on Karátiza hill, near the Shaturgardan. It was forwarded officially for opinion, the presence of some metallic copper having given rise to the impression that the ore was peculiarly rich. This was not confirmed by analysis; the total yield of metal being only 26 per cent. It is a very mixed ore, with much silicious matter finely disseminated.

From the northern side of the range, again, specimens were sent by Major Stewart, of the Corps of Guides, from the so-called ruby-mine near Jagdalak. It appears that the gems found there were highly prized by the natives, a guard being kept constantly at the mine by the Amir, and it was naturally thought that it might prove a source of revenue. However this may be, it is certain that the gem is not the true ruby, but only spinel-ruby, which is very little thought of in Europe, its value being not more than a tenth that of the true oriental ruby, or red sapphire. The spinel can generally be most readily distinguished by its carmine-red colour and its crystalline form, in regular octahedrons, as is well seen in the specimens furnished by Major Stewart. A good specimen of the rock in which it occurs was also sent; it is a largely crystalline micaceous limestone.

I have also laid on the table a specimen of beautiful verdantique marble, or calcareous serpentine, brought by Major Biddulph from Shigar in Ladakh where it is continuously worked and sold as "yessham" or jade.

Dr. RÁJENDRALÁLA MITRA exhibited some very old palm-leaf MSS. and some ancient coins.

Dr. Mitra said that, in his paper on the Pála and the Sena Rájás of Bengal, he had occasion to advert to the era of Lakshmana Sena, and to refer to certain Sanskrit MSS. which were dated in that era. He had since been able to obtain some MSS. of the kind as also some others of very old dates. These he submitted as proofs of the era in question having been current all along from the time of its initiation to a very recent date. The codices were written with ink on palm-leaf (*Corypha elata*), and appeared very much decayed and crumbling; but the writing was clear and fairly

correct. One of the MSS. was dated the 6th of Śrāvana ১৫০৯, but the cypher was obviously a mistake, for 1509, would make it correspond with A. D. 2614, which would be absurd. Nor is the mistake an uncommon one; ignorant copyists very often put in a dot to indicate hundred and then put in the unit, though correctly in the decimal system the unit figure should occupy the place of the dot. Dr. Mitra had seen many instances of the kind in the pagination of MSS. Taking the date at 159 of the Lakshmaṇa it would correspond with 2265 of the Christian year, and the MS. would consequently be 615 years old. That would make it the oldest Bengali record that had yet been discovered. The place where the MS. was written is not mentioned, but it was found in the village of Nisidāgaḍ, Post Bayinehi, in the Burdwan district, and the writing was of the pure Bengali, and not of the Maithilī style. If these facts could be accepted as proofs of its having been written in Burdwan, it would show that the era was at the time current over a much larger area than that of Tirhoot. It showed also that the Bengali character written over six hundred years ago, was very much like what it was in the last century. The subject of the record was a commentary on the *Pratyaksha Khaṇḍa* of Gaṅgeśa, by Jayadeva Miśra, and this proved that the commentator lived some time before the date of the MS.

The second MS. laid on the table was the *Mitāksharā* commentary on the law of Yājñavalkya. According to its colophon it was copied by Śrīnātha Sarmā, in the village of Bhandnāja, on the 14th of the wane in the month of Vaiśākha, ১৩০৯ = A. D. 1506. This gives to the codex an age of 373 years. The third MS. was the *Dharmaratna* of Jīnutavāhana, and bore date Śaka 1417 = A. D. 1499, which gives it an age of 383 years. It is a work of considerable repute, but exceedingly rare. The last was the *Sūdrapaddhati* of Apipāla, written in the Samvat year 1442 = A. D. 1385, i. e., 495 years ago. Dr. Mitra had not seen the work cited in current digests on the religious duties of the Sūdras of which it treats, but it appears to be a very comprehensive and well-written summary of all the laws current on the subject.

Dr. Mitra also exhibited a small collection of coins lately obtained by him from money-changers at Bombay. It included an Egyptian gold-piece of 1277 H.; 10 and 20 cent pieces of Hongkong, Italy, Mauritius, France, Spain and Mexico; a 5-Frank piece of Napoleon I, (1812); a 50-Lepta of Greece; a 50-Koptek of Austria; a ½ guilder of Netherlands India; and rupees of most of the native States of India. Of old coins there were two good rupees of Muhammad bin-Tughlak; several Bull and Horsemen tankās of Chahaḍa Deva, Syalapati Deva, and Shams-uddīn Altimish; half a dozen specimens of the silver currency of the Khālifs; of several Sassanians; and

some Parthians. Among the last were drachmas of Arsaces Artabanus, and Arsaces Sinatroces. Of the former there were four specimens with the legend in perfect preservation thus—*βασιλεὺς βασιλεὺς ἀρσίου δικαίου ευεργετοῦ ἐπιφανίου φιλέλληκος*, with the monogram  $\bar{\Lambda}$  under the extended bow of the king. Of the latter there was an only specimen and one word in its legend was illegible. It had no monogram. Its legend runs thus—*βασιλεὺς Μεγάλου ἀρσίου φιλοπατροῦ — ἐπιφανίου φιλέλληκος*.

Mr. H. F. BLANFORD exhibited an actinometer of a new form, the invention of Professor Balfour Stewart, recently constructed for the Alipore Observatory. Also the older forms of actinometer invented by Herschell, Pouillet (the Pyrheliometer) and Hodgkinson, and described the object and principle of these instruments.

An actinometer is essentially a thermometer, having in general a large bulb and a very contracted column; and its object is to measure the quantity of heat, (or, to speak more strictly, the radiation) received from the Sun, in a certain definite interval of time (which may be half a minute or more) by observing the expansion thereby produced, which is a function of the quantity of heat received, and the mass and nature of the fluid heated. An ideally perfect actinometer would be one which should completely absorb and convert into heat all the radiation which falls on its exposed surface, while it should remain entirely unaffected by radiation to or from bodies around, other than the Sun, and by any change of temperature in the air or other medium in contact with it. But this, of course, cannot be realized.

In Professor Balfour Stewart's actinometer, the disturbing influences are reduced to a minimum, so far as is compatible with simplicity of arrangement and working. The thermometer which is mercurial, having a bulb of about the size and form of a walnut, is enclosed in a massive hollow cube of brass, perforated by a small hole in the middle of one side, which can be closed by a sliding screen, and through which a beam of the sun's rays concentrated to a focus by a lens  $2\frac{1}{2}$  inches in diameter is directed on the thermometer bulb. With the exception of this small aperture, a massive brass wall blackened internally completely surrounds the thermometer and screens it from the variable radiation of surrounding objects, and the chamber itself is also protected by a casing of felt and an outer coating of polished brass plates. The instrument is mounted on a massive iron stand affording a motion both in azimuth and altitude. In use the instrument possesses the great advantage of simplicity over all other forms of actinometer. Having been placed in position, so that the Sun's image in the focus of the lens falls on the shutter immediately over the aperture already noticed, the shutter is withdrawn, and the concentrated beam allowed to fall on the thermometer bulb during the

space of two minutes by the chronometer ; the temperature being observed at the instant of withdrawing the screen and again on closing it. There is, of course, an unknown loss of heat by absorption in the lens and reflection from its surface, so that the measurement obtained is only a relative and not an absolute determination, but the same must be said of other forms of actinometer, and meanwhile an instrument that affords a good relative measurement and is so simple in manipulation is a very important addition to our means of observation.

Dr. HOERNLE exhibited 10 copper coins of the Mitra dynasty, kindly sent by Mr. H. Rivett-Carnac, for the inspection of the Society. In a note accompanying the coins, Mr. Rivett-Carnac says, that he obtained them through Mr. H. Pratt from the vicinity of Rāmnagar, in the Bareilly District, and that Mr. A. C. Carlleyle, of the Archæological Survey, to whom he sent them for inspection, read the legends and, at his request, prepared a detailed description of the coins, to be read before the Society. The description is entitled—

*Coins of the Sunga or Mitra Dynasty found at Rāmnagar or Ahichhatra, the ancient Capital of North Panchāla in Rohilkhand ; the property of H. RIVETT-CARNAC, ESQ., C. I. E., F. S. A., &c. Described by A. C. CARLLEYLE, of the Archæological Survey of India.*

(Abstract.)

After some introductory remarks on the wide extent of the sway of the Mitra dynasty, the author mentions that he himself obtained a considerable number of these coins from excavations at Bhuila, the site of the ancient city of Kapilavastu, in the Basti District ; but the coins obtained by Mr. Rivett-Carnac (about 110) are mostly of a much larger size, and several bear names of kings which are either new or of rare occurrence ; such as Bhadraghosa, Phaguni-mitra, Srayān-mitra and Anu-mitra. Taking into account the numerical proportion, in which the coins of the various kings were found in the hoard, as well as the older or later form of the alphabetic characters of the legends and some other peculiarities, the author proceeds to arrange the coins in the following chronological order : 1, Bhadraghosa (5 coins), 2, Srayān-mitra (7) ; 3, Bhanu-mitra (10) ; 4, Agni-mitra (11) ; 5, Anu-mitra (1) ; 6, Phaguni-mitra (28) ; 7, Bhūmi-mitra (34) ; 8, Indra-mitra (2). The impressions on these coins are very much alike. The Obverse always shows a square depression, caused by a die, containing the legend (the mere name of the king in the genitive case), with three symbols above, arranged in a horizontal row. These symbols are said to be the Bodhi-tree, Linga and two serpents intertwined. The Reverse shows

either a figure of Buddha as teacher, or the Buddhist symbols of the "San-gha" and the Law (a wheel).

This paper will be published in the Journal, Part I.

Dr. Hoernle stated that he had shown the coins to General Cunningham, who had empowered him to communicate to the meeting that while generally agreeing to Mr. Carlleyle's description of the coins, he took exception to two of his readings. Instead of Śraya-mitra and Anu-mitra, as read by Mr. Carlleyle, he thought the names were Sūrya-mitra\* and Ayu-mitra. Dr. Hoernle also gave some account of what was hitherto known about the Mitra-Dynasty from Sanskrit sources, especially the Vishnu Purāna and the Mālavikāgni-mitra; pointing out the wide divergence between names of the Mitra kings as found on the coins and as handed down in those Sanskrit works. He added that the first coin of these kings (one of Agni-mitra) was noticed by General Cunningham, as far back as 1852 (see Lassen, Ind. Ant. II, 47). Since then coins of this dynasty had been found from time to time; and General Cunningham had told him, that he possessed a considerable number of coins of Indra-mitra, who is placed at the bottom of his list by Mr. Carlleyle on account of the paucity of his coins.

Dr. Rājendralāla Mitra said, the coins laid on the table were very interesting, and the acknowledgements of numismatists were due to Mr. Rivett-Carnac for the opportunity he had given them of examining the coins. The first to notice a Mitra coin was the distinguished antiquarian General Cunningham, and Sir Edward Bayley subsequently got two or three specimens; but so large a collection as that of Mr. Rivett-Carnac had never before come to notice. It supplied many links, hitherto missing, of a dynasty which was known only from casual mention of two or three names in Purānas and works of fiction, like the 'Mālavikā Agnimitra,' and the time, he hoped, would soon come when the chronology of the dynasty would be settled satisfactorily. He took exception, however, to the classification which had been adopted by the author of the paper read, and to the principle on which that classification had been based. The principle was an arithmetical one, and priority and posteriority were regulated by the number of coins found in the trove. That king who was represented by a single specimen of his coinage was accepted as the oldest; he was reckoned the second, two of whose coins had come to hand; and the largest number of coins represented the latest king. Dr. Mitra thought this principle to be a fallacious one, calculated to mislead at every step. A hundred different circumstances might lead to a trove containing more coins of one reign than of another, without any reference to their age. To take an instance ready at

\* In a communication from Mr. Carlleyle, received after the meeting, he says, that he now also reads the name Sūrya-mitra.

hand, he said, the packet of miscellaneous coins he had laid on the table contained one coin each of Victoria and Isabella—a 20-cent piece of Mauritius and a 40-cent piece of Spain,—and five coins of the Arsacidan dynasty, and six of the Sassanians. Were the packet treated as a trove, or to become a trove under some circumstance or other, the principle, faithfully worked out, without reference to history, would result in the conclusion that the Queen-Empress Victoria and Isabella were the oldest, that the Parthians were much later than these, and that the Sassanians were the most recent. A principle that would lead to such a conclusion was open to the gravest objection. The author of the paper had himself felt this objection, and had met it by adding that he had supplemented it by his knowledge of the gradual changes which the Laṭ character had undergone in course of time. Dr. Mitra took exception to this also, for he thought no one, however well-versed he may be in the old character, could, from the appearance of three or four smudgy letters on two coins, say which was the anterior and which the posterior. The total number of Laṭ inscriptions was so exceedingly limited that it was impossible from a study of them to acquire such a test of the gradual changes which letters undergo in course of time as would suffice to determine the difference in the writing of two consecutive reigns. The coins were all of copper, bearing letters varying from one-tenth to one-twentieth of an inch in size, more or less covered with rust, and otherwise defaced; the coin of the so-called Anu Mitra was the smallest, and the letters on it were one-twentieth of an inch in size, and to attempt to judge of palæographic changes from them was simply impossible. With far simpler means and opportunities, one in a hundred well-educated persons, would not venture to determine the difference in the shape of the letters forming the words ONE RUPEE on the coins of William IV and Victoria. Dr. Mitra had seen only the coins laid on the table, and in them he could trace no such palæographic difference as would justify him in arranging them chronologically.

Dr. Mitra also took exception to the reading of two of the names. One of these he had communicated to General Cunningham whose revised reading had been announced by the Society. The other was that of Anu Mitra, which he read Bhānu Mitra. The letter *a* in the Laṭ character was very like the English K reversed thus *Ṃ*, with the projecting arms slightly curved, and the *bh* was like the same English letter with the upper arm removed. Now, among Mr. Rivett-Carnac's coins there was one which was unquestionably of Bhānu Mitra, and in the other which Mr. Carlyle took for Anu Mitra, the upper part of the first letter was smudgy and covered with rust, and only the lower part was clear, and from that no one could fairly restore the upper part, and make a new name of it.\*

\* Examined with a high-power magnifying glass a few granulations appeared be-

Dr. Hoernle said, that he quite agreed with Dr. Mitra, that the principle of determining the chronology of the dynasty by the numerical proportion of their coins in a particular hoard, which Mr. Carlleyle had put forward, was not a very safe one. It certainly required to be worked with very great care; and many other circumstances also would have to be taken into account, in order to control the results obtained by the application of that principle. Mr. Carlleyle himself, however, admitted as much in his paper. In the case of the supposed hoard containing coins of Queen Victoria of England, Queen Isabella of Spain, and of the Arsacidan and Sassanian Dynasties, there would be no difficulty for numismatists to determine the relative age of the dynasties by other considerations, quite independent of such a trivial circumstance as the numerical proportion of the coins in the hoard. But when it was the case of a single dynasty, the reigns of which did not range over much more than a century and about which as yet so little was known historically, every circumstance, however trivial it might be, was of importance; though no doubt sufficient judgment and discrimination, as Mr. Carlleyle said, would have to be used to apportion to each circumstance its relative importance. Mr. Carlleyle's chronological arrangement could only be looked upon as a provisional one, which would have to be verified or modified by information derived from coins found in other hoards. With regard to the reading Bhánumitra (instead of Anumitra), proposed by Dr. Mitra, Dr. Hoernle stated that he had carefully examined the coin, which happened to be one of the best preserved of the collection, and he fully concurred with General Cunningham in his reading of the first letter as *a* (not *bh*); the upper arm of the letter being quite distinctly visible to his eye.

The coin in question was handed round and several who were present stated that they could recognize the upper arm of the letter.

A letter was read from Lieut. R. C. Temple on an Inscription at Sultánpúr in Kulu-Elí in which he writes:

"I see a translation of the Nirmand Inscription in Kulu by Dr. R. Mitra in the August Proceedings of this Society. I got a copy of it, myself about 1½ years ago and sent it to Dr. Burnell, but do not know what has happened to it since. There is another Kulu Inscription which it might be worth while copying and translating. It is in the Chaugán at Sultánpúr in Kulu and on a large stone near the civil offices. I was never able while serving in the Kangra Valley to get at it myself, and made several unsuc-

hind the first letter; but they are perfectly detached, and seem never to have formed a part of the letter. If they be joined they would not produce an oblique line such as is required to produce the upper oblique spur of the Palí *ṃ*. R. M.

cessful attempts to get others to copy it for me. The Society may, however, have means of having it copied, and I therefore write to let them know of its existence. It is said locally to relate to the construction of the Kūl or open artificial watercourse in its neighbourhood."

"I send herewith some specimens obtained in 1878 of the local "Pahāri" alphabet still employed by the Kāngra Banias and people of that class in the valley, as they may be of use. I would point out the position of short "i" as being *after* instead of *before* the consonant it qualifies as in ordinary Nāgari, and the representation of long "i" by *two* strokes following the consonant, e. g., गि = नि and गी = नी.

The following papers were read—

1. *Note on some Ladāk Maximals.*—By R. LYDEKKER, B. A.  
This paper is published in the Journal, Part I.
2. *On the Great Siva Temple of Ganjai-Kōṇḍapuram, in the Trichinopoly District.*—By LIEUT.-COL. B. R. BRANFILL. Communicated by MAJOR-GENERAL J. T. WALKER, R. E., C. B., F. R. S. *Surveyor-General of India.*

(Abstract.)

The temple which is described in this paper is situate in the extreme E. N. E. part of the Trichinopoly District, 20 miles S. W. from Chidambaram. Roughly speaking it is a facsimile of the great Tanjore temple, possibly its prototype, or perhaps more probably a copy; but never having been "restored" as the Tanjore example has, and being built throughout in a very hard kind of stone, it retains much of its pristine appearance and purity of design, which has been lost there. It consists of a grand stone stubi or Vimānam, 100 feet square at base and about 165 feet high. Attached to it, on the east side, is the Mele-maṇḍapam, a three-storied portico or transept, covering the cross aisle between the north and south entrances to the temple. To its east again and attached to it, is the west wall and end of the great outer court (Veli-maṇḍapam), which was never completed. The whole is raised on a basement or terrace, at a height of about 5 feet above the (original) ground level. The paper also briefly describes some other places of architectural interest. In one of them, Chenji-kōṭṭai, the author found a curious carved stone lying in front of a small shrine dedicated to a local goddess called Kamala-kānni-y-Amman to whom human sacrifices were formerly offered. It shows four human heads, surrounded by trisuls, ram's and buffalo's horns, arrows and a bow.

This paper, together with a sketch of the carved stone, will be published in the Journal, Part I.

3. *On the Coins of the Mahārājas of Kangra.*—By C. J. RODGERS,  
Principal of the Normal College, Amritsar.

(Abstract.)

This paper describes twenty-four coins of Kangra, commencing with Samakṭa Deva and ending with Triloka Chandra Deva. The former is supposed to have preceded Pithama, or Pithama Chandra Deva, who is the first of the Kangra Rājās of whom coins have been found. He is assigned by General Cunningham to the year 1330 A. D. The date of Triloka Chandra Deva, according to the same authority (Arch. Report, Vol. V, p. 152), is 1610 A. D. All these coins have a bull on the Obverse, with the name of the king above it; the Reverse shows a horseman.

This paper will be published in the Journal, Part I.

4. *On the Barometer in Asia and Australia, and on the Sun-spot Cycle.*—  
By H. F. BLANFORD, F. G. S.

(Abstract.)

The three years 1876, 1877 and 1878 were characterized by a very persistent excess of atmospheric pressure throughout India and the Malay-an region. It was most intense on an axis lying between the Andamans and Bengal, and was relatively less both to East and West of this line. To the South, Singapore and Batavia showed a similar excess of pressure, less intense but more prolonged; and in Australia, the registers of Adelaide, Melbourne and Sydney show that there also the pressure was excessive; being most so at Adelaide, (where it exceeded that of any Indian Stations), and least so at Sydney. To the North again, in Asia the greatest excess is that shewn by stations in Western Siberia. It appears therefore as far as can be judged from the existing dates, that it was most intense on an axis lying obliquely across the two great continental masses of Asia and Australia.

An examination of the barometric registers of past years shows that at Batavia, Singapore and Port Blair there has been a regular and gradual rise of pressure since 1870, which at Singapore (situated in Lat. 2°) was of remarkable regularity. The register of Batavia which extends back to 1866 shows that at that station it reached a maximum in 1868, sank rapidly to a minimum in 1870 and rose to a maximum again in 1877, the oscillation thus conforming approximately to that of Sun-spot variation. With more or less regularity, the same oscillation is shown by the registers of other stations, and those of Calcutta and Bombay which reach back respectively to the years 1853 and 1847 prove that this variation with the

Sun-spot cycle is a regularly recurrent phenomenon, the minimum pressure coinciding with the maximum of sun-spots and *vice versa*.

Turning to Siberia, an oscillation of the opposite kind is met with, and of much greater amplitude. It appears to be restricted to Western Siberia and European Russia, and is shewn most prominently by Ekaterinenburg at the Eastern foot of the Ural. It is equally great at St. Petersburg but more marked by non-periodic variations. But it is not distinctly traceable in the registers of Tiflis, nor in those of Nectchingk and Pekin. Those of the last station seem rather to indicate an oscillation of the Indo-Malayan type. In the Indo-Malayan region the variation was very decided as affecting all seasons of the year, being only somewhat more pronounced in the winter (of the Northern hemisphere) than in the summer months. But the opposite variation in Western Siberia was entirely restricted to the winter months.

From this it results that the excessive pressure of 1876-78 was the maximum phase of a cyclical variation in India and the Malay region; and there only. In Northern Asia it was quite anomalous, and most probably also in Australia; and even in the intervening Indo-Malayan region, it is probable that the phenomenon was intensified by an aperiodic or anomalous excess being superimposed on the regular and cyclical excess of pressure.

This paper will be published in Part II of the Journal.

### LIBRARY.

The following additions have been made to the Library since the Meeting held in December last.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL;  
FOR FEBRUARY, 1880.

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The Annual Meeting of the Asiatic Society of Bengal was held on the 14th of February, 1880, at 9 P. M.

H. B. MEDLICOTT, Esq., F. R. S., President, in the Chair.

According to the Bye-Laws of the Society, the President ordered the voting papers to be distributed for the election of Officers and Members of Council for 1880, and appointed Lt.-Col. Seance and M. von Eetvelde, Scrutineers.

The PRESIDENT called upon the Secretary to read the Annual Report.

ANNUAL REPORT FOR 1879.

In presenting the following report on the condition of the Society during the year 1879, the Council are glad to be able to congratulate the Members again upon the satisfactory state of its affairs. Thirty-three Members were added to the list during the year, of whom 2 were old Members who were re-entered without election, and 31 were new Members. The total number removed from the list was 32, of whom 10 died and 14 retired. The total number of Ordinary Members at the end of the year was 329 as compared with 327 at the end of 1878. Of the Ordinary Members 36 are absent from India, and of the rest 111 are Resident, 154 Non-Resident, 16 Foreign and 12 Life Members.

The annexed tabular Statement shows the fluctuation in the number of Ordinary Members during the past 6 years.

YEAR.	PAYING.				NON-PAYING.		TOTAL.
	Total.	Resident.	Non-Resident.	Foreign.	Life.	Absent.	
1874 .....	312	127	184	...	3	32	346
1875 .....	292	113	179	...	3	50	345
1876 .....	291	119	175	...	5	48	347
1877 .....	290	113	163	14	9	46	345
1878 .....	285*	117	153	15	13	29	327
1879 .....	281	111	154	16	12	36	329

During the year Professor Henry and M. Stanislas Julien, two of the Honorary Members of the Society, died. To fill the vacancies thus caused and others existing previously, the following gentlemen have been appointed to be Honorary Members:—Prof. E. B. Cowell, Dr. A. Günther, Dr J. Janssen, Prof. H. Milne-Edwards, Prof. P. Regnaud, and M. E. Renan.

The following names of Ordinary Members appear in the obituary of the year:—

Nawab Amir Ali Khan Bahadur, Mr. R. S. Brough, Mr. G. B. Damant, Mr. R. B. Shaw, Mr. H. C. Sutherland, the Maharaja of Vizianagram, Mr. G. Robb, Mr. F. L. Beaufort, Mr. F. Wilcox and Capt. C. J. F. Forbes, F. R. G. S.,

In Mr. Brough the Society lost a most active Member. He died suddenly of cholera, on the 3rd April, having only the previous evening attended, apparently in good health, a meeting of the Society; and assisted in showing experiments in connection with a paper on a “new standard of light” read by Mr. Schwendler. He promised to become in time an eminent physicist, and was the author of the following papers in the Proceedings of the Society:—

In 1877. “A theoretical deduction of the best resistance of a telegraph receiving instrument.”

“Note on Prof. Graham Bell’s telephone.”

“On a case of lightning; with an evolution of the potential and quantity of the discharge in absolute measure.”

“On the diameter of the wire to be employed in winding an electromagnet in order to procure the maximum magnetic effect.”

In 1878. “Magnetic elements for northern India.”

\* A mistake was printed in last year’s Report.

"On the proper relative sectional area for copper and iron lightning rods."

### Indian Museum.

The following presentations made to the Society have been transferred to the Indian Museum under the provisions of Act XXII of 1876.

(1). Sculptural stones from Buddha Gaya, presented by the Government of Bengal, through Dr. R. Mitra.

(2). Three small figures; one stone, one bronze, and one copper.

(3). A celt found by Capt. Badgley at Shillong, in 1873.

(4). Geological and other specimens collected by Lieutenant R. C. Temple in the march between Kala Abdulla Khan and Lugari Bakhán.

Three vacancies in the office of Trustees having occurred through the departure to England of Mr. W. T. Blanford, the President; of Major J. Waterhouse and of Mr. T. S. Isaac,—Dr. Hoernle, Dr. Lewis and Mr. Crawford were elected Trustees on the part of the Society.

### Finance.

It will be seen from the accounts annexed to this Report that the financial condition of the Society is satisfactory, notwithstanding the loss of income involved in the reduction of the rate of interest on its investments in Government Securities.

A special Committee was appointed during the year to consider and report on the form of account hitherto kept by the Society, and, in accordance with its recommendations, the system of accounts is now under revision. Mr. Westland, to whom the thanks of the Society are due for undertaking this important work, has completed the revision of the Society's accounts, which will accordingly be found published in a form somewhat differing from that adopted in former years. Similarly, the accounts of the O. P. Fund and Conservation of Sanskrit MSS. Fund will shortly be revised and placed on a more satisfactory footing.

### London Agency.

At the close of 1878 there was a balance due from the Society to Messrs. Trübner and Co., amounting to £28-10-2. The sale proceeds of the Society's publications, sold by Messrs. Trübner during that year, amounted to Rs. 868-1-7 and of the Bibliotheca Indica to Rs 311-4-0.

Nineteen invoices, consisting of publications of Scientific Societies presented to the Society, and of books purchased, were received from Messrs. Trübner and Co. during the past year. The money value of these consignments was £136-17-8. 404 copies of the Journal, and 316 copies of the Proceedings were despatched to them for sale, besides 628 copies of the Bibliotheca Indica publications.

### Library.

The additions to the Library during the year comprise in all 1,433 volumes or parts of volumes. Of these, 741 were received as presentations from Government, from authors, or by exchange, and 692 were purchased.

In last year's report it was stated that the Catalogue of the books in the Library which had been carried out under the late Mr. Blochmann required careful revision. On examination, the work done was found to be defective and it is now being carefully revised under the directions of the President. Twenty-two book-cases have been examined, and the cataloguing of 2,431 books carefully checked. As there are more than 7,570 books, in cases numbered up to 86, it appears that little more than a quarter of the work is accomplished. It is necessarily a tedious process, and cannot be hurried through, while the Assistant Secretary can only give it his spare hours from current work.

### Publications.

The publications issued by the Society during the year comprise 10 numbers of the Proceedings consisting of 293 pages of text with 11 plates. Four numbers of the Journal Part I, have been issued containing 405 pages, illustrated with 9 plates. Of the Journal Part II, 4 numbers also have been issued consisting of 234 pages of text with 25 plates. The Title-Page and Index of Part II of 1879, will be issued with No. 1 for 1880, and the fourth part of Part I of 1879 will be published in a few days.

The 1st Part of the extra number to which allusion was made in last year's report, containing Moore and Hewitson's "Descriptions of New Indian Lepidoptera found in the collection of the late Mr. W. S. Atkinson" has now been received, and is ready for distribution to Members.

### Building.

The total amount expended in repairs to the Society's premises during the year was Rs. 438-8-0. Besides this, Rs. 110 was spent on removing 4 ancient pillars supporting the staircase, which were claimed by the Trustees of the Indian Museum, and substituting light iron pillars. Half of this charge was recovered from the Trustees of the Museum.

### Coin Cabinet.

The additions to the Coin Cabinet have been very large during the year under review. The total number of coins added, is 167. This is, in a great measure, owing to the orders of Government, issued, at the instance of the Council, to the Civil Authorities throughout the country to inform the Asiatic Society of all finds of coins within their respective jurisdictions, in order to give it a chance of purchasing. Accordingly a large number of

purchases have been made; altogether 122. Among these are four gold coins, two Roman (of Domitian and Vespasian) and two South Indian (a Pagoda and a Mada). Again 114 silver coins; *viz.*, 19 of Sher Sháh of Delhi (six are new); 15 of Islám Sháh of Delhi; 1 of Muhammad Sháh of Bengal, 1 of Sultán Jalál-uddin Muhammad Sháh of Bengal; 2 of Bahádur Sháh of Bengal; 1 Surat Sháhi; 1 of Sher Sháh of Lakhnau, 1 Maohjídár of Lakhnau; 1 Tara Sháhi; 1 Choli Mohesh; 1 of Burhampur, 1 of Banjrangárh; 12 from Guzarát (Patkóos?); 12 from Budaon (five with the imperfect legend Sri Mahama.....); 2 of Mahmúd Sháh (from Bijnaur)\*; 1 from Sattara; 1 from Surat; 1 from Nassik; 1 Bakhri Rupee; 14 intermediate between the Indo-Scythian and the Adi Varáha series; 12 early Hindu punched coins from Hoshiarpur and the 24-Parganahs; 3 Choli of Alexander; 1 of Ptolemy Philadelphus, 1 of Antiochus Epiphanes, 1 of Antiochus, 1 of Philip III of Macedon, 1 of Antoninus, 1 of Demetrius, and four unnamed. The copper coins purchased are four; *viz.*, 2 of the Bull and Horseman type (from Hoshiarpur); 1 large Alexander, and 1 large Antoninus.

The number of coins presented is 45; *viz.*, 8 gold, 3 silver, and 34 copper. Among these there are two gold (one of Chandragupta II and one of the series intermediate between the Guptas and the Indo-Scythians) and two copper (of Azes and of Su-Hermaeus) from F. S. Growse, Esq., c. s.; 6 gold (out of the Ahin Posh Tópe find, 3 of Kadphises, and 3 of Kanerki) from the Indian Government; 3 silver (of Bahádur Sháh, Sher Sháh and Islám Sháh) from Babu Surjyanarain Singh; 29 copper (of the Maharájahs and Sultáns of Kashmir) from Charles J. Rogers, Esq., Principal of the Normal College in Amritsar; and 3 copper (modern Nepali pice) from Syed Ahmed Khán.

A Catalogue of all the coins in the Society's Cabinet is in course of preparation.

### Secretary's Office.

Dr. A. F. R. Hoernle has continued to hold the Philological Secretaryship and charge of Part I of the Journal.

Major J. Waterhouse performed the duties of General Secretary till December, when Mr. J. Crawford was appointed in his place. Major Waterhouse also edited Part II of the Journal until Mr. Wood-Mason resumed the Natural History Secretaryship in October.

\* Legend; *obv.*, the great king, conqueror of the world and faith, Abul Muzaffar Mahmúd, son of the king. *Rev.*, during the reign of Mu'tasim, Lord of the Faithful. Round the circle on both sides, struck this silver coin in the city of Delhi in the year 653 Hijra.

The Treasurership has been held throughout the year by Mr. Beverley, with the exception of about 3 months from May to July, when Mr. Medlicott acted for him.

Mr. W. E. Bateman resigned the Assistant Secretaryship in February, and Mr. W. A. Bion was appointed in his place.

Mr. Andrews, and Babus Kedarnath Bysack and Ramjibun Mookerjee have continued to hold the post of Assistant Librarian, Cashier and Assistant Cashier respectively. Babu Jadubinda Bysack left the service of the Society in September, and was succeeded, as storekeeper, by Babu Jogendranath Mittra.

### Bibliotheca Indica.

In the two series together, twenty-four fasciculi were issued during the year; four in the Persian, and twenty in the Sanskrit. They belong to eleven different works, of which three, in the Sanskrit series, have been completed. The latter are the Agni Purāna, the Chaturvarga Chintāmani and the Kātantra. Of the works published one, in the Persian series, is an English translation of the Tabaqāt-i-Nāṣirī; the rest are text editions, nine in Sanskrit and one in Persian.

#### A. Persian Series.

Major H. G. Raverty has brought out two fasciculi of his annotated English translation of the TABAQĀT-I-NĀṢIRĪ. The addition of two more fasciculi, it is expected, will complete the work.

Maulvi Abdur Rahim of the Calcutta Madrasah has issued one double-fasciculus, consisting of two numbers, of the Persian text of Abul Fazl's AKBAR NAMAII. These complete the second volume of the work, of which one volume more remains to be published, in order to complete it. It contains the history of Akbar's reign to 980 Hejira (A. D. 1572). An index to Vol. II of all proper names mentioned in it, similar to that of Vol. I, will also be published.

#### B. Sanskrit Series.

Dr. Rājendralāla Mitra has brought out the last fasciculus of the AGNI PURĀṆA. The text edition of that work was completed last year in three volumes. Dr. Mitra has now added an English introduction, which very fully describes the contents of that important work. It is a sort of Cyclopædia of Sanskrit Literature, and is beside the Vishnu Purāna and the Vayu Purāna, the most ancient and most authentic of that class of Sanskrit works. The text of the first has been edited twice, though not by this Society. An edition of the text of the second is now in course of publication by the same learned editor, to whom the Society is indebted for the edition of the Agni Purāna.

Of the *VAYU PURĀNA*, the editor of which, as above mentioned, is Dr. Rājendralāla Mitra, three fasciculi have been issued. An English translation of this work will appear under the auspices of the Oxford University authorities.

The text of the *TAITTIRIYA SAMHITA*, which is, edited by Paṇḍit Maheṣachandra Nyayaratna, the Principal of the Sanskrit College, has been advanced by two fasciculi. The work contains the, earliest recension of the mantras of the Black Yajur Veda together with the commentary of Mādhava Achārya.

The same learned editor has also issued one more fasciculus of the *MĪMĀNSA DARŚANA*, a critical commentary on the Ritual of the Veda accompanied by the commentary of Śaṅkara Svāmīn.

Of the *GOPIHITA GRĀHYA SUTRA* three fasciculi have appeared. The edition is illustrated by a commentary compiled by the editor himself, Paṇḍit Chandra Kānta Tarkālakāra. The work is expected to be completed in the course of the current year; only one more fasciculus is wanting.

Paṇḍit Bāla Sāstrī, of the Benares College has brought out the seventh fasciculus of the *BRĀHMATI*, which is a Gloss on Sankara Achārya's commentary on the Brahma Sūtras by Vāchaspati Miśra. Owing to ill-health the learned editor was not able to complete the work during the past year, as he had hoped to do; but there is every prospect of its being concluded in the present year.

Six fasciculi have been issued of HEMĀDRI'S *CHATURVARGA CHINTĀMANI*. This concludes the second volume. Three MSS. of one of the three remaining volumes, the *Śraddha Khaṇḍa*, have been collected. The rest cannot be published, for want of MSS. from which to edit them.

The scholarly edition of the *KĀTANTRA*, for which the Society is indebted to Professor J. Eggeling of Edinburgh, has also been completed during the year, by the issue of the fifth and the sixth fasciculi. The last fasciculus is enriched by excellent critical notes and an index of Sūtras, contributed by the editor. This is one of the most important grammatical works of India, inasmuch as it is the most complete existing representative of the Sanskrit Grammar before Pāṇini. The text contains both the sūtras and the commentary on them by Durga Siṅha.

Dr. A. F. Rudolf Hoernle's edition of the *PRITHIVĪJA RASAU*, the famous epic of Chand Bardāi in old Hindi, has advanced by one fasciculus, the third of Part II. The work is a large one and the difficulties, owing to the ancient character of its language, considerable; moreover one of the co-editors, Mr. J. Beames, who has published one fasciculus of Part I, has retired from the work. It will be some time, therefore, before it can be brought to a conclusion.

The following is a detailed list of the publications issued during 1879.

*Persian Series.*

1. *TABAQAT-I-NASIRI*, by Abú 'Amr-i-'Usmán, translated by Major H. G. Raverty. Nos. 358 and 359. Fasc. IX and X.
2. *AKBÁR-NÁMAH*, by Abul-Fazl-i-Mubárák-i-Allámí, edited by Maulavi 'Abd-ur-Rahím, Calcutta Madrasah. Nos. 431, 432. Vol. II, Fasc. IV.

*Sanskrit Series.*

3. *AGNI PURÁNA*, a system of Hindu Mythology and Tradition, edited by Dr. Rájendralála Mitra, C. I. E. No. 421. Fasc. XIV, (Introduction).
4. *VAYU-PURÁNA*, a system of Hindu Mythology and Tradition, edited by Dr. Rájendralála Mitra, C. I. E. Nos. 420, 424, 428. Fasc. I—III.
5. *TAJTTIRÍYA SAMHITÁ*, of the Black Yajur Veda, with the commentary of Mádhava Áchárya, edited by Paṇḍit Maheṣa Chandra Nyayaratna. Nos. 239, 241. Fasc. XXX and XXXI.
6. *MÍMÁNSA DARŚANA*, with the commentary of Sávara Svámin, edited by Paṇḍit Maheṣa Chandra Nyayaratna. No. 388. Fasc. XIV.
7. *GOBHILÍYA GRHYA SÚTRA*, with a commentary by the editor, edited by Chandra Kánta Tarkálankára. Nos. 415, 416, 423. Fasc. VIII, IX, X.
8. *BHÁMATÍ*, a Gloss on Sankára Áchárya's commentary on the Brahma Sútras by Váchaspati Miśra, edited by Paṇḍit Bála Sástri. No. 427. Fasc. VII.
9. *CHATURVARGA CHINTÁMANI*, by Hemádri, edited by Paṇḍits Yogesvara Bhaṭṭáchárya and Kámákhyánátha Tarkaratna. Nos. 417, 418, 419, 422, 426, 429. Vol. II, Part, II, Fasc. VII—XII.
10. *KÁTANTRA*, with the commentary of Durga Siṅha, edited with notes and indexes, by Dr. Julius Eggeling. Nos. 396, 397. Fasc. V and VI.
11. *PRITHIRÁJA RASAU*, of Chand Bardái in the original old Hindí by Dr. A. F. Rudolf Hoernle. No. 430. Part II. Fasc. III.

Among the works which it is contemplated by the Society to publish in the place of those which have been completed or are approaching completion, there are the following :

*Arabic-Persian Series.*

1. English Translation of the *Tarikh-ul-Khulfa* by Jaláluddín-ús Suyúti with a short memoir of the author, by Major H. S. Jarrett, B. S. C.

2. English Translation, with notes, of Vol. II. of the *Ain-i-Akbari*, uniform with the late Mr. Blochmann's annotated translation of Vol. I, by Captain H. W. Clarke, R. E.

*Sanskrit Series.*

1. *MĀITRĀYAṆĪ SAMHITĀ*, one of the best known texts of the Yajur Veda, edited by Dr. L. Schroeder.

2. English Translation with notes, of the *KATHĀ SARIT SĀGARĀ*, the well-known treasury of Indian Folklore, by C. H. Tawney Esq., M. A., Principal of the Presidency College.

3. English Translation, with notes, of the *CHARAKA*, the oldest Hindu work on Medicine, by Dr. Mahendralāla Sarcā.

*List of Societies and Institutions with which Exchanges of Publications have been made during 1879.*

Amsterdam :—Royal Zoological Society.

Batavia :—Batavian Society of Arts and Sciences.

Berlin :—Royal Academy.

Berne :—Swiss Entomological Society.

Bombay :—Bombay Branch, Royal Asiatic Society.

——— :—Editor, Indian Antiquary.

Boston :—Natural History Society.

Bordeaux :—Bordeaux Academy.

Buenos Ayres :—Public Museum.

Brussels :—Royal Academy of Sciences.

——— :—Geological Society of Belgium.

Calcutta :—Agricultural and Horticultural Society of India.

——— :—Geological Survey of India.

Cherbourg :—National Society of Natural Science.

Christiana :—University Library.

Copenhagen :—Royal Society of Northern Antiquaries.

Cambridge :—University Library.

Colombo :—Royal Asiatic Society, Ceylon Branch.

California :—Californian Academy of Arts and Sciences.

Dehra-Dun :—Great Trigonometrical Survey.

Dublin :—Royal Irish Academy.

Edinburgh :—Royal Society.

Geneva :—Physical and Natural History Society.

Genoa :—Museum of Natural History.

Königsberg :—Physical and Economical Institution.

Leipzig :—German Oriental Society.

Leyden :—Royal Herbarium.

Liège :—Royal Society of Sciences.

- London :—Royal Society.  
 ——— :—British Museum.  
 ——— :—Royal Asiatic Society of Great Britain and Ireland.  
 ——— :—Royal Institution.  
 ——— :—Institution of Civil Engineers.  
 ——— :—Institution of Mechanical Engineers.  
 ——— :—Royal Geographical Society.  
 ——— :—Zoological Society.  
 ——— :—Statistical Society.  
 ——— :—Geological Society.  
 ——— :—Linnean Society.  
 ——— :—Anthropological Institute.  
 ——— :—Royal Astronomical Society.  
 ——— :—Royal Microscopical Society.  
 ——— :—Editor, Athenæum.  
 ——— :—Editor, Academy.  
 ——— :—Editor, Nature.  
 ——— :—Society of Telegraph Engineers.  
 Lyo —Agricultural Society.  
       —Natural History Society.  
       :—Museum of Natural History.  
 Madras :—Literary Society.  
 Manchester :—Literary and Philosophical Society.  
 Moscow :—Société des Naturalistes.  
 Munich :—Royal Academy.  
 Netherlands :—Royal Society.  
 New Haven, U. S. :—Connecticut Academy of Arts and Sciences.  
 New South Wales :—Royal Society.  
 Oxford :—Bodleian Library.  
 Paris :—Imperial Library.  
 ——— :—Anthropological Society.  
 ——— :—Asiatic Society.  
 ——— :—Geographical Society.  
 ——— :—Zoological Society.  
 Philadelphia :—Academy of Natural Science.  
 Pisa :—Tuscan Society of Natural Sciences.  
 Stettin :—Entomological Society.  
 Stuttgart :—Natural History Society of Wurtemberg.  
 St. Petersburg :—Imperial Library.  
 ——— :—Imperial Russian Geographical Society.  
 ——— :—Imperial Academy of Sciences.  
 ——— :—Imperial Botanical Gardens.

Stockholm :—Royal Academy of Sciences.

Trieste :—Adriatic Society of Natural Science.

Turin :—Academy.

United States, America :—Geological Survey of the Territories.

Vienna :—Imperial Geological Institute.

——— :—Anthropological Society.

——— :—Imperial Academy of Sciences.

——— :—Zoological Society.

Washington :—Smithsonian Institution.

——— :—Commissioners of the Department of Agriculture.

Yokohama :—German Oriental Society.

——— :—Asiatic Society of Japan.

#### ABSTRACT OF PROCEEDINGS OF COUNCIL DURING 1879.

##### *January 2nd. Ordinary Meeting.*

A recommendation of the Finance Committee, with reference to a letter from Messrs. Trübner and Co., dated 13th August, that Messrs. Trübner should be allowed to sell the *Journal and Proceedings* at 4s. and 1s. respectively, while accounting to the Society at the rate of 3s. and 9d., was agreed to.

##### *January 30th. Ordinary Meeting.*

The sale of the out-house situated at the north-west corner of the Society's premises for Rs. 100 was approved of.

##### *February 4th. Special Meeting.*

The Annual Report and Accounts were submitted.

##### *February 27th. Ordinary Meeting.*

The Members of the Finance and other Committees were elected.

##### *March 27th. Ordinary Meeting.*

The Proceedings were ordered to be sent monthly by Parcel Express, and the Journals quarterly, to Messrs. Trübner and Co.

Dr. A. F. R. Hoernle's offer to make a *Catalogue raisonné* of the coins in the Society's Cabinet was accepted.

It was resolved that the Government should be asked to give the Society some of the duplicates among the coins found in the *Abin Posh* Tope.

Mr. J. Westland was appointed a Member of the Finance Committee.

Copies of Mr. H. Rivett-Carnac's letters on the subject of the preservation of Antiquarian Remains were ordered to be submitted to Government, with a suggestion from the Council, that District Officers and Engi-

neers of State Railways should be requested to preserve all Archæological Remains they might come across.

A letter from the Secretary to the Government of India, Department of Revenue, Agriculture and Commerce, No. 69 (Marine Surveys), dated 18th March, forwarding copy of a letter from Commander A. D. Taylor on the subject of the Sea Dredging Operations, and requesting that the Government may be favoured with any remarks which the Society may desire to offer thereon, was referred to the Dredging Committee.

*May 1st. Ordinary Meeting.*

A letter was read from the Under-Secretary to the Government of Bengal, No. 76<sup>6</sup>/<sub>8</sub> Misc., dated 27th March, forwarding a copy of a letter from the Officiating Secretary to the Government of India, Home Department, No. 654, dated 18th March, conveying the thanks of the Governor-General in Council to Dr. Rájendralála Mitra for his suggestions on the subject of the discovery and preservation of the records of ancient Sanskrit literature. The letter was ordered to be recorded.

A letter was read from the Under-Secretary to the Government of Bengal, No. 76<sup>8</sup>/<sub>8</sub> Misc., dated 27th March, forwarding copy of a resolution dated 18th March, re-distributing the sum of Rs. 24,000 sanctioned for the preservation of Sanskrit MSS., and requesting that a report of the progress made in all branches of the work may be submitted as early as possible after the close of the official year 1879-80. The letter was ordered to be recorded, and a copy to be sent to Dr. Mitra with a request that he would be kind enough to prepare the required report.

A request that the Society's publications should be sent to the Chandernagore Pustakagar was declined.

The Minutes of the Council upon a letter from the Under-Secretary to the Government of Bengal No. 71<sup>6</sup>/<sub>8</sub> Misc., dated 27th March, appointing the President and Natural-History Secretary *ex-officio* Members of the Zoological Gardens Committee, was ordered to be recorded.

Professors Cowell, Regnaud and H. Milne-Edwards and Drs. Rájendralála Mitra, Janssen and Günther were nominated Honorary Members.

The Secretary reported that Mr. H. B. Medicott had agreed to undertake the duties of Treasurer to the Society, during Mr. Beverley's absence on leave.

*May 29th. Ordinary Meeting.*

A letter from the Officiating Under-Secretary to the Government of India, Department of Revenue, Agriculture and Commerce, No. 113, dated 22nd May, stating that, owing to the present financial pressure, the Government find it impossible to engage the services of Messrs. Murray and Piercy to aid the Sea Dredging Operations, was ordered to be recorded.

The exchange of the Society's publications, containing botanical papers, for the "Acta Horti Petropolitani" was sanctioned.

A Committee, composed of Messrs. Beverley, Westland and Douglas, was appointed to consider the question of a change being made in the keeping of the Society's accounts.

The question of Captain H. W. Clarke's translation of the 2nd volume of the Ain-i-Akbari was ordered to be deferred, as definite information had been received that Mr. Blochmann had completed the translation of the 2nd volume before his death.

The notice of the proposed change of Rule 14e was ordered to be circulated to Resident Members.

An application from the Geographical Society of Metz for an exchange of publications was declined.

The sum of Rs. 300 was ordered to be remitted to Mr. Grote for the purchase of coins from the Freeling Collection.

Mr. J. Douglas was appointed a Member of the Finance, and Major Jarrett of the Philological, Committee.

#### *June 26th. Ordinary Meeting.*

A reward of Rs. 100 was ordered to be offered to any one giving information that would lead to the discovery of the MSS. of the late Mr. Blochmann's translation of the 2nd volume of the Ain-i-Akbari.

#### *July 31st. Ordinary Meeting.*

A letter from Major H. S. Jarrett, dated 9th July, requesting the Society to undertake the printing of his translation of the Tarikh-ul-Khulfa, was referred to the Philological Committee.

An application from the Adelaide Philosophical Society for an exchange of publications was declined.

#### *August 28th. Ordinary Meeting.*

A letter from the Under-Secretary to the Government of Bengal, No.  $\frac{1580}{140}$  Misc., dated 13th August, stating that the Lieutenant-Governor approved of the manner in which the Government grant to the Society for the Conservation of Sanskrit MSS. had been spent, was ordered to be recorded.

The receipt of 12 gold coins from the Ahin Posh Tope, presented by the Government of India, Home, Revenue and Agricultural Department, was ordered to be acknowledged with thanks.

It was resolved that Major-General J. T. Walker should be asked to accept the office of President, and that Mr. Wood-Mason be appointed Member of Council, in place of Mr. W. T. Blanford.

The Secretary reported that Mr. Grote had lodged the money, sent for the purchase of a selection from the Freeling Collection of coins, with Messrs. H. S. King and Co., as it was uncertain whether the collection would be sold, unless it could be done so *en bloc*.

*October 2nd. Ordinary Meeting.*

An application from the Royal Microscopical Society for an exchange of publications was agreed to.

It was ordered that, as Mr. Blochmann's MSS. could not be found, Captain H. W. Clarke should be informed that he could proceed with the work of translating the 2nd volume of the *Ain-i-Akbari*.

Mr. Westland was appointed Member of Council, and Dr. Hoernle Trustee of the Indian Museum, in place of Mr. T. S. Isaac.

The Minutes of the Council were read on a letter from Major-General J. T. Walker declining the Presidentship of the Society.

It was resolved that Mr. C. H. Tawney should be asked to accept the office.

The thanks of the Society were ordered to be conveyed to Messrs. Grote and Moore for the trouble they had taken in the publication of the 1st Part of the "Descriptions of New Indian Lepidoptera."

*October 16th. Ordinary Meeting.*

A letter was read from the Under-Secretary to the Government of Bengal, No. 972, dated 9th October, forwarding copy of a letter to Mr. G. A. Grierson stating that the Lieutenant-Governor had been pleased to sanction a grant of Rs. 400 to the Society, as a subscription for the number of copies of his *Maithili Grammar* covered by this sum. The letter was ordered to be recorded.

M. E. Renan's name was ordered to be inserted in the list of the Honorary Members.

An advance to Dr. Mitra of Rs. 600 from the Conservation of Sanskrit MSS. Fund to be expended in the search for Sanskrit MSS. was sanctioned.

Mr. Wood-Mason was re-appointed Natural-History Secretary.

A pension of Rs. 4 per mensem was granted to Manu, the office Jamaadar, who had been in the service of the Society for 25 years.

*November 27th. Ordinary Meeting.*

A letter from the Under-Secretary to the Government of India, Home, Revenue and Agricultural Department, No. 1922, dated 16th October, sanctioning an additional sum of Rs. 1,500 for the cataloguing of the Sanskrit MSS. in the Maharája of Bikanir's Library, was ordered to be recorded.

The exchange of the Society's publications for Professor Carl's "Reperitorium für experimental Physik" was sanctioned.

The thanks of the Council were ordered to be conveyed to Mr. Westland for his Memorandum on the proposed change in the Society's accounts, and his scheme was ordered to be adopted from the 1st of January 1880.

On Mr. Tawney's declining to accept the Presidentship of the Society, Mr. H. B. Medlicott was appointed President. Messrs. Tawney and Westland were appointed Vice-Presidents, and Mr. J. Crawford Member of Council and General Secretary.

A Memorandum was submitted by Mr. H. B. Medlicott, showing the progress made in the revision of the new Catalogue.

The whole of the printing of the Bibliotheca Indica Series was ordered to be made over to the Baptist Mission Press.

The price of coloured copies of Moore and Hewitson's "Descriptions of New Indian Lepidoptera," Part I, was fixed at Rs. 6, or Rs. 4-8 for Members.

#### *December 24th. Ordinary Meeting.*

The exchange of the "Academy" for the Society's publications was sanctioned.

An application from the Royal Zoological Society of Amsterdam for an exchange of publications was agreed to.

It was resolved that half the cost of substituting iron pillars for the 4 stone ones formerly supporting the staircase in the Society's Rooms, and which had been made over to the Indian Museum, should be recovered from the Trustees.

Mr. J. Crawford was appointed a Trustee of the Indian Museum, and Mr. J. F. Browne a Member of the Philological Committee.

A recommendation of the Finance Committee, that an increase of Rs. 10 per mensem should be made to the pay of the Assistant Librarian, was approved.

The PRESIDENT then delivered the following address—

### *PRESIDENT'S ADDRESS.*

GENTLEMEN,

I have already, on the very recent occasion of my nomination, expressed regret that a more suitable President had not consented to stand. I have now only to thank you for the honour you have conferred upon me, and to engage to do my best in performing the duties entrusted to me.

It would be contrary to usage to expect an address from a newly-made President; indeed, as my election is confirmed only this evening, there would be a sort of impropriety in my appearing before you with a ready-made retrospect of work; and my total un readiness at impromptu speaking,

or indeed any kind of speaking, should have made me again persist in declining a position in which such readiness is more or less essential. The few remarks I have now to make relate only to business.

The suggestion may be traceable to my personal failing, as just now indicated, but in thinking over the Society's welfare and prospects, as your President is bound to do, it has appeared to me with some force of reason that a presidential address is a serious stumbling-block in our case, and, as such, an indicator of a difficulty that threatens the Society. It is the only compulsory work contingent upon membership—excepting, of course, the onerous duties undertaken by our Honorary Secretaries—and it falls upon an office that should, under our circumstances be free from any such burden. In the good old times when we were all amateurs, when Sir Edward Ryan and Sir James Colville presided over us, each for ten or more successive years, no such task seems to have been thought of. The innovation is traceable to the advent of the inevitable working man, the professional student. As a member of the brotherhood I may speak of him without offence. He soon introduced the customs of his kind, and set up the didactic business, with the annual display of fireworks over the achievements of the year. I am not prepared to say that the practice is an evil: an occasional taking stock of progress, local or general, (as was done for us last year by Mr. Blanford) is most useful and instructive, and there are sometimes gifted men who can turn every such opportunity to account, but as a regular institution an annual presidential address is everywhere more or less of an incubus, and under certain circumstances may be seriously damaging, as I think it would be with us.

In normal communities scientific societies are mostly restricted to special branches of study, and are sufficiently supported by men more or less devoted to that study, and who think it an honour, and an advantage to belong to the society. For larger societies that deal with all subjects there are also enough and to spare of scientific workers seeking the advantages or the honour of fellowship. If there were any need to illustrate how abnormal is the community to which we belong in India, the statistics of our Society would be much to the point. The relation of the body to the members seems to be almost the reverse of what I have indicated as normal. The very precarious hold the Society has upon its members has always been a complaint, but instead of mending with the advance of civilization, there are signs of its becoming a serious disease. This has been distressingly exhibited of late in connexion with a praiseworthy endeavour made by our administration to get the affairs of the Society into more regular working order. In some instances when notice was sent to members, calling attention to the rules of the Society and stating how long the subscription had been in arrears, while they had been in regular receipt of

the Journal, instead of apologising for their neglect, as a proper sense of the situation would dictate, they have not been ashamed to take offence at the notice, and to request the removal of their name from the list of members. The fact, I say, is a caution against attempting to regulate our practice too closely on the pattern of Societies in a normal community. Except for the unavoidable introduction of a few scientific professional men, the community in India is very much what it was 50 years ago, although habits may have changed; and our Society is now as then very largely composed of members of the several services whose interest in science of any kind is more or less nominal, and who join the Society principally under a vague sense of duty, that, as representatives of a higher civilization, they should contribute to sustain in this country the only free exponent of the basis of that civilization. Several causes have tended to slacken that sense of duty. The greatly increased facilities of intercourse with the mother country, whereby we can have quick enjoyment of many of the privileges of her higher life, tends to obliterate the hitherto sentiment that India is at least our foster mother, that we are here as representative men, with claims upon us that would not apply in the home country. There are around us men who are in a way good representatives of modern intelligence, who, in former times, would certainly have taken an interest if not an active part in this Society, but who now affect to ignore it. On this plea we have a very strong appeal to make: no amount of borrowed light can compensate India for the extinguishing of ever so small a source of independent light within herself. In the good old times when we were all amateurs, several scientific or literary societies in different parts of India managed to exist for various periods; they have long since become extinct; and from the beginning till now our Society has been the only one that has sustained a regular life. Even as compared with many societies in Europe, the career of the Asiatic Society of Bengal has been a distinguished one. It will be a disgrace to Englishmen in India if its sustenance should fall short.

From the statistics of our Society there is a more unfortunate experience to be learned than the danger I have pointed out. That danger might be of no account if indigenous resources had been awakened and developed, but of this there is still but small evidence. However Englishmen may conduct themselves in India, they can never of themselves form the normal community which it is the function of civilization to establish. Superficially it did not seem an unreasonable hope that the seeds of knowledge would take root in this country, and in time yield an abundant crop of native scientific workers, amongst whom this Society would find its natural support. It is not to be doubted that this hope is yet to be realised, but it seems as if the time required for the evolution were to be

reckoned by geological rather than by ordinary life periods. I find indeed the names of some 50 native gentlemen in our list of members, but a very small minority of them are working partners, and these are still exclusively attracted to the less exact branches of research, such as philology and archæology, the cultivation of which studies had been long carried on under indigenous methods. It seems as if a *nidus* for the seed of natural science had not as yet been formed, or else even such teaching as has been given must have borne fruit.

I have twice referred to the age of amateurs; and, from the lips of a 'professional,' it might be thought that the term was meant slightly. I used it as peculiarly designating the bond of fellowship that should unite a Society like ours. The receipt of pay is certainly not exalting: the only conditions to save it from being debasing are, that the work should be congenial, and that no pains should be spared to make it good; and these are the characters that distinguish the amateur. His is a spirit that should make every honest work invigorating. No doubt the title is variously applied; some usurp the name who work only for show; but these should take rank with other quack professors, as the true professional man may lay claim to the position of amateur. It is in this capacity that he is admitted to our Society.

To come back to our starting point: I have made a principal appeal to the moral consciousness of Englishmen in India, but it behoves us to do what we can to conciliate so capricious an auxiliary. If it should come to be thought that the Society is in the hands of, and sufficiently provided for by, devotees in the shape of experts and 'professionals,' we should risk losing the very slight hold we have upon a large number of our members. I do not speak without a knowledge of the subject, and I believe that some such notion has already begun to take effect; and the object of my remarks is to suggest the only remedy I can think of—that we should not disguise our position as amateurs, that we should, if possible, as of old, select our President from those whom the men we have to look to are accustomed to follow. From this point of view the innovation of an annual address is certainly a scare and an impediment: which is the thesis I started with. I am not prepared to say whether it is possible to interfere with what may be an inevitable process of elimination: but that would not affect the accuracy of the diagnosis of our position I have submitted for your consideration.

Although I have uttered a sort of Cassandra warning, it is, I am happy to say, apparent from the report you have heard read that our venerable Society is not yet on the verge of dissolution. The papers presented at our meetings during the past year are of high interest: in terrestrial physics we have heard the results of the very important series of

pendulum observations in India, communicated by General Walker; and Mr. H. F. Blanford has made several interesting contributions from his studies in meteorology. In applied physics, valuable researches have been exhibited by Mr. Schwendler and by Colonel Tennant, R.E. In natural history, philology, archæology and geography many instructive papers were read and published. As a personal favour, I would ask permission to mention here why there should be a conspicuous absence of geological work in our publications, while the members of the Geological Survey have certainly not been idle members of the Society: it is because the Survey possesses in its Records a quarterly publication of its own, easily obtainable by every one, and in which all work of interest receives prompt notice.

It is in connexion with the Library that members are most wont to complain. While admitting that these complaints are founded on fact, I would emphatically point out that guilty members are chiefly to blame for the grievance. In a Society so old as ours and originally so well set up, the collection of books should now be very valuable; and so it is; but irreparable losses have been inflicted by the unconscionable conduct of members, in taking out books and never returning them. The evil is far from extinct; men seem to think that their book-shelves are to be permanently stocked with works of reference from the Society's Library, and that, as members, they can do just as they please. It seems of little use to make rules, for reference to them is in some cases constantly disregarded. I would earnestly appeal to the sense of our members to be more reasonable in this respect. Another cause of inefficiency is that from which every institution in India is more or less a sufferer—the very frequent change and removal of comptrolling officers who may take a personal interest in the establishment; and thirdly, there is the great difficulty in India of procuring a permanent salaried officer who is competent for the higher duties of a Librarian. An effort is now being made to get the Library into better order. In every moment that can be spared from routine work, our new Assistant Secretary is engaged in cataloguing and arranging the books upon an approved system.

In the matter of accounts I have to make special mention of the great obligation the Society is under to Mr. J. Westland. Our accounts have no doubt always been effectively comptrolled and audited, but in a very complicated and troublesome manner. Mr. Westland has, with much personal labour, completely re-organised our financial records upon a proper technical system.

I would finally ask you to join me in thanking our Honorary Secretaries for their unwearied attention to the affairs of the Society.

The **PRESIDENT** announced that the Scrutineers reported the result of the Election of Officers and Council as follows :

**H. B. Medlicott, Esq., M. A., F. R. S., F. G. S.,**

*President.*

**Dr. Rájendralála Mitra, C. I. E.**

**J. Westland, Esq., C. S.**

} *Vice-Presidents.*

**C. H. Tawney, Esq., M. A.**

**J. Wood-Mason, Esq. .**

**Dr. A. F. R. Hoernle.**

*Secretaries and Treasurer.*

**J. Crawford, Esq., C. S.**

**H. Beverley, Esq., C. S.**

**H. B. Medlicott, Esq., F. R. S.**

**Dr. Rájendralála Mitra, C. I. E.**

**J. Westland, Esq., C. S.**

**C. H. Tawney, Esq., M. A.,**

**Major-General J. T. Walker, F. R. S.**

**D. Waldie, Esq., F. C. S.**

**A. W. Croft, Esq., M. A.**

**H. F. Blanford, Esq., F. G. S.**

*Members of Council.*

**Babu P. C. Ghosha, M. A.**

**Dr. T. R. Lewis.**

**L. Schwendler, Esq.**

**J. Wood-Mason, Esq.**

**Dr. A. F. R. Hoernle.**

**H. Beverley, Esq., C. S.**

**J. Crawford, Esq., C. S.**

Messrs. J. Douglas and J. Westland were appointed to audit the annual accounts.

The Meeting was then resolved into the Ordinary Monthly General Meeting.

**H. B. MEDLICOTT, Esq., F. R. S.,** President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From Mrs. G. H. Damant,—Gaur : its Ruins and Inscriptions. By J. H. Ravenshaw.

2. From Dr. D. B. Smith,—2 Astronomical Charts.

3. From the Meteorological Reporter to the Government of India,—Register of Original Observations in 1879, reduced and corrected. January 1879.

4. From the Chief Secretary to the Madras Government,—two silver coins.

The following gentlemen, duly proposed and seconded at the last meeting, were ballotted for and elected Ordinary Members—

The Hon'ble Arthur Wilson. Behárilál Gupta, Esq., c. s.

The following are candidates for ballot at the next meeting—

1. Lieut. R. C. Tufnell, 30th Madras Infantry, proposed by M. Longworth Dames, Esq., c. s., seconded by Dr. A. F. R. Hoernle.

2. Ramēshvar Maliah, Esq., proposed by Dr. R. Mitra, seconded by J. Crawford, Esq.

3. A. C. Carlleyle, Esq., proposed by Dr. A. F. R. Hoernle, seconded by J. Crawford, Esq.

The SECRETARY reported that Dr. R. A. Barker had compounded for his future subscriptions.

The COUNCIL reported that Mr. Wood-Mason had been elected Member of Council on the 28th August, and had been re-appointed Natural-History Secretary on the 16th October.

The SECRETARY read the following letter from Col. J. F. Tennant, F. R. S., drawing the attention of the Society to the 1st Part of Vol. I of Professor Newcomb's "Astronomical Papers for the use of the American Nautical Almanac :"—

"I should like to draw the attention of members of the Asiatic Society who may be interested in Ancient Chronology depending on Solar Eclipses, to the First Part of Vol. I of 'Astronomical Papers for the use of the American Nautical Almanac.' It is published in 1879 at Washington.

"The author, Professor Newcomb, Superintendent of the Almanac, has recently been engaged in comparing Hanssen's Lunar Tables with the records of old eclipses, and he has arrived at certain results as to the corrections required to satisfy observation. In the work I mention (a quarto of 56 pages), he has given an investigation of the laws of the recurrence of eclipses, and obtained some relations not generally known or appreciated. Aided by these, and taking Hanssen's Tables as a basis, he has given tables which enable one to ascertain, in a very short time, what eclipses occur in any year between B. C. 700 and A. D. 2300, and to recognize their nature. Further tables enable one to compute, with great ease, the fundamental numbers required for computing the phenomena of the eclipse by Bessel's method.

"All the results are approximate, but, when dealing with ancient records, these approximations are sufficient, and, even in modern times, the tables will give accuracy enough to enable one to know the character of an eclipse and the rough limits of its several phases."

The following papers were read:—

1. *A History of the Fossil Vertebrata of India.*—By R. LYDEKKER, B. A.

The author requested that this paper might be taken as read, as it was too long to be read *in extenso* at the meeting. He remarked that the history of the fossil vertebrates of India was intimately connected with the Asiatic Society of Bengal, and it was, therefore, appropriate that a sketch of the state of our knowledge of the subject should be presented to the public through the Society.

This paper will be published in the Journal of the Society, Part II, No. 1 for 1880.

2. *On the Zoological Position of the Barhal, or Blue-Sheep of Thibet.*—By R. LYDEKKER, B. A.

(Abstract.)

The author showed that the characters of the skull and horns in this animal indicated closer relationship with the goats than with the sheep, while the external characters were closer to those of the sheep, and concluded that Hodgson's genus *Pseudois* should be retained for the 'barhal.'

This paper will be published in the Journal, Part II.

Mr. Wood-Mason made a few remarks on this paper.

3. *An Account of the Verification in part of a set of Standard Weights, and the Relative Values of the Series of Weights in use.*—By COL. J. F. TENNANT, R. E., F. R. S., *Master of the Mint.*

(Abstract.)

This paper describes the method by which a portion of the weights of an English Bullion set have been compared, and their values found in terms of a Standard Ounce, known in terms of the English Standard Pound. Colonel Tennant has given full details, showing how the comparison and evaluation can be systematically carried out in some cases, and how an exceptional case can be dealt with. He has everywhere kept a record of the probable errors generated in his procedure, and has endeavoured to make his paper such that it may serve as a guide to any one who may have to verify weights. Tables are given in the appendix which are necessary to reduce the results of weighings in air to what they would have been in a vacuum, and in determining specific gravities.

Lastly, Colonel Tennant compares the advantages of several systems of weights, and discusses the best value of a Standard weight and describes the results he has arrived at, and by which he has been guided, in making arrangements for a set of Standard Tolah weights for the Mint.

This paper will be published in the Journal, Part II

4. *Rude Megalithic Monuments in North Arcot.*—By LIEUT.-COL. B. R. BRANFILL. Communicated by MAJOR-GENERAL J. T. WALKER, R. E., C. B., F. R. S.

(Abstract.)

The tombs described in this paper are of unusual interest on account of the size, shape and arrangement of the slabs of which they are composed, and the rarity of their chief characteristic.

They are 30 feet in diameter, and consist of 3 concentric rings of upright stone slabs, half of them being semicircular at top. The three rings are of various heights, the outermost being 3 feet, the innermost 12 or 15 feet high, above the cairn. The whole forms an imposing structure and recalls the idea of a small citadel or fortification. On excavating, the usual sepulchral relics were found in them, except that iron weapons were very scarce. The chief novelty to the author were two or three Tamil letters, found scratched on a fragment of a little bowl.

This paper will be published in the Journal, Part I.

5. *Supplementary Note to the Paper on the Coins of the Sunga or Mitra Dynasty.\**—By A. C. CARLLEYLE, Esq., of the Archæological Survey.

(Abstract.)

This paper describes another, apparently *unique*, coin of a king of the Sunga dynasty, called Ayu-mitra. He must have been one of the latest of the dynasty, as the letters of the legend belong to the later Gupta period. The obverse shows a bull, with the inscription underneath, "ayu-mitasa;" the reverse apparently has a peacock and palm-tree.

This paper will be published in the Journal, Part I.

The following communication has been received—

*Remarks on the Afghans found along the route of the Tal Ohotiali Field Force in the spring of 1879.*—By LIEUT. R. C. TEMPLE, B. C. S., F. R. G. S., M. R. A. S.

\* See Proceedings for January 1880.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in January last.

## TRANSACTIONS, PROCEEDINGS AND JOURNALS,

*presented by the respective Societies and Editors.*

Berlin. K. preuss. Akad. der Wissenschaften,—Monatsbericht, September and October 1879.

Bombay. The Indian Antiquary,—Vol. VIII, Nos. 100, 101; Vol. IX, No. 102: December 1879 and January 1880.

Bordeaux. Société de Géographie Commerciale,—Bulletin, No. 24, 15th December 1879, and No. 1, 5th January 1880.

Calcutta. Mahābhārata,—No. 42.

The Hague. K. Instituut voor de Taal-Land-en Volkenkunde van nederl. Indië,—Bijdragen, Vol. III, Nos. 1 and 2.

Hanover. Geographische Gesellschaft,—Erster Jahresbericht, 1879.

London. Athenæum,—Nos. 2721—2725.

———. Geological Society,—List of Fellows on November 1st, 1879.

———. ———. Quarterly Journal, Vol. XXXV, Part 4, November 1879.

———. Institution of Mechanical Engineers,—Proceedings, No. 4, August 1879.

———. Nature,—Vol. XXI, Nos. 529, 531, 533.

———. Royal Astronomical Society,—Monthly Notices, Vol. XL, No. 1, November 1879.

*Herschel, Major.*—Note on the Difference of Variation of Gravity at Revel and St. Petersburg; and on Grischow's Pendulum Observations at other stations.

*Draper, Prof. J. C.*—On a Photograph of the Solar Spectrum, showing Dark Lines of Oxygen.

———. Royal Geographical Society,—Proceedings, Vol. I, No. 12, December 1879.

———. Royal Microscopical Society,—Journal, Vol. II, No. 7, December 1879.

*Mayall, J.*—Immersion Stage Illuminator. Record of Current Researches relating to Invertebrata, Cryptogamia, Microscopy, &c.

Munich. Repertorium für Experimental Physik,—Vol. XV, No. 12, 1879.

Palermo. Società degli Spettroscopisti Italiani,—Memorie, Disp. 8, August 1879.

- Paris. *Journal Asiatique*,—Vol. XIV, No. 2, August—September 1879.  
 ———. *Société d'Anthropologie*,—Bulletin, Vol. II, No. 2, April—July 1879.  
 ———. *Société de Géographie*,—Bulletin, November 1879.  
 ———. *Société Zoologique de France*,—Bulletin, Parts 5 & 6 for 1878, and Parts 1 to 4 for 1879.  
     1879. *Bureau, Dr. L.*—Recherches sur la mue du bec des oiseaux de la famille des *Mormonidés*.  
 Pisa. *Società Toscana di Scienze Naturali*,—Processi Verbali, Adunanza del di 9 Novembre 1879.  
 Roorkee. *Professional Papers on Indian Engineering*,—Vol. IX, No. 35, January 1880.  
 Washington. *Geological and Geographical Survey of the Territories*,—Bulletin, Vol. V, Nos. 2 and 3.

### MISCELLANEOUS PRESENTATIONS.

Report on the Administrations of the License Tax in Bengal for 1878-79. Fcp., Calcutta, 1879.

Records of the Geological Survey of India,—Vol. XII, Part 4, 1879.

*Waagen, Dr. W.*—Note on the "Attoc" Slates and their probable Geological Position. *Theobald, W.*—On a Marginal Bone of an undescribed Tortoise, from the Upper Siwaliks, near Nila in the Potwar, Punjab. *Foote, R. B.*—Sketch of the Geology of the North Arcot District. *Wynne, A. B.*—On the Continuation of the Road Section from Murree to Abbottabad.

#### BENGAL SECRETARIAT.

RAVENSHAW, J. H. Gaur; its Ruins and Inscriptions. Fol., London, 1878.

Mrs. G. H. DAMANT.

Report on the Administration of the North-West Provinces and Oudh for the year ending March 31st, 1879. 8vo., Allahabad, 1879.

#### GOVT. OF THE NORTH-WEST PROVINCES.

The Indian Antiquary,—Parts 100, 101 and 102.

#### HOME, REVENUE AND AGRIC. DEPT.

Registers of Original Observations in 1879, reduced and corrected. January 1879.

#### METEOR. REPORTER TO THE GOVT. OF INDIA.

### PERIODICALS PURCHASED.

Calcutta. The Calcutta Review,—No. 139, January 1880.

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Geneva. Archives des Sciences physiques et naturelles,—Vol. II, No. 12. 15th December 1879.

Giessen. Jahresbericht über die Fortschritte der Chemie. 1879, Part II.

Göttingen. Gelehrte Anzeigen,—Nos. 49—51.

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London. The Academy,—Nos. 398—402.

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Hartog, M. M.—Notes on *Sapotaceæ*.—II.

———. British Association for the Advancement of Science,—Report of the Meeting held at Sheffield, in August 1879.

———. The Chemical News,—Vol. XL, Nos. 1047, 1048; Vol. XLI, Nos. 1049—1051.

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Lewis, G.—Diagnoses of new *Elatерidae* from Japan. Gosse, P. H.—Singular occurrence in a Dipterous insect.

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Seeborn, H.—Remarks on certain Points in Ornithological Nomenclature.

Tristram, H. B.—On a Collection of Birds from the Solomon Islands and New Hebrides. Wardlaw-Ramsay, R. G.—Ornithological Notes from Af-

ghanistan,—No. I. Wharton, H. T.—On the Orthography of some Birds' Names. Marshall, G. F. L.—On a new Pheasant from the North-West

Himalayas. Gurney, J. H.—Notes on a "Catalogue of the Accipitres in the British Museum," by R. B. Sharpe. On the Occurrence of *Ninox borneensis*

in Java, and of a large Form of *Scops lempiji* in Sumatra. Layard, E. L.—On a new Thrush from the Loyalty Islands Group. Salvadori, T.—On a

new Hawk of the Genus *Urospiziqs*, Haup, from Bourou.

———. The Annals and Magazine of Natural History,—Vol. IV, No. 24, December 1879.

Staden, W. P.—On the Structure of *Astrophisura*, a new and aberrant Genus of *Echinodermata*. Butler, A. G.—Descriptions of new Species of Lepidoptera

from Japan. Ridley, H. N.—On a new Copepod of the Genus *Doridicola*.

Lewis, G.—On certain new Species of *Coleoptera* from Japan.

———. The Nineteenth Century,—Vol. VI, No. 34, December 1879.

———. The Numismatic Chronicle,—Vol. XIX, Part 3, 1879.

———. The London, Edinburgh and Dublin Philosophical Magazine,—Vol. VIII, Nos. 51 and 52.

No. 51. Nichols, E. L.—A new explanation of the Colour of the Sky. Hutchin-

son, C. C.—On the Separation and Estimation of Cadmium in the presence of Zinc; with Remarks upon the Separation of Copper, Cadmium and Zinc.

Rosetti, F.—Experimental Researches on the Temperature of the Sun. Ray-

leigh, Lord.—Investigations in Optics, with special reference to the Spectroscope.

No. 52. Rosetti, F.—Experimental Researches on the Temperature of the Sun.

Hunt, R.—On the Influence of the Solar Rays on Vegetation. Schwendler, L.

—On a Simple Method of using an insignificant Fraction of the Main Current produced by a Dynamo-electric Machine for Telegraph Purposes.

London. The Publishers' Circular,—Vol. XLII, Nos. 1014 and 1015.

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The Action of Light on Plants. Are the Chemical Elements Simple Bodies? Darwinism and Articulate Speech.

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New Haven. The American Journal of Science and Arts,—Vol. XVIII, Nos. 106—108, October—December 1879.

No. 106. *Draper, H.*—Coincidence of the Bright Lines of the Oxygen Spectrum with Bright Lines in the Solar Spectrum.

No. 107. *Marsh, O. C.*—History and Methods of Palæontological Discovery. New Jurassic Mammals.

No. 108. *Draper, H.*—Photographing the Spectra of the Stars and Planets. *Brooks, W. K.*—Artificial Fertilization of Oyster Eggs, and Embryology of the American Oyster. *Broadhead, G. C.*—Origin of the Loess. *Marsh, O. C.*—New Jurassic Reptiles.

Paris. Annales de Chimie et de Physique,—Vol. XVIII, November 1879.

———. Comptes Rendus,—Vol. LXXXIV, Nos. 7 and 17; Vol. LXXXV, Nos. 6, 17 and 26; Vol. LXXXVII, Nos. 2 and 21; Vol. LXXXIX, Nos. 23—26; Vol. XC, No. 1.

———. Index to Vols. LXXXVI and LXXXVIII.

———. Journal des Savants,—Vol. for 1839, and No. for December 1879.

———. Revue Critique,—Vol. VIII, Nos. 50—52; Vol. IX, Nos. 1 and 2.

———. Revue des deux Mondes,—Vols. XCIX and CIV; Vol. XXXVI, Part 3; Vol. XXXVII, Parts 1 and 2.

Revue Scientifique,—Vol. XVII, Nos. 24—26; Vol. XVIII, Nos. 27 and 28.

## BOOKS PURCHASED.

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CANDOLLE, A. P. DE. Prodromus Systematis Naturalis Regni Vegetabilis. 17 Vols. 8vo., Paris, 1824-73.

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[APPENDIX.]

LIST OF MEMBERS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
ON THE 31ST DECEMBER 1879.

# LIST OF ORDINARY MEMBERS.

R. = Resident. N. R. = Non-Resident. N. S. = Non-Subscribing.

L. M. = Life Members. F. M. = Foreign Members.

N. B.—Members who have changed their residence since this list was drawn up, are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alteration may be made in the subsequent edition. Errors or omissions in the following list should also be communicated to the *Secretaries*.

Members who are about to leave India and do not intend to return, are particularly requested to notify to the *Secretaries*, whether it be their desire to continue as members of the Society, otherwise, in accordance with Rule 40 of the Byo-laws, their names will be removed from the list at the expiration of three years from the time of their leaving India.

Date of Election.

1860 Dec. 5.	R.	Abdul-Latif, Khán Bahádur, Maulawí. <i>Calcutta.</i>
1868 Sept. 2.	N.R.	Adam, R. M., Depy. Commissioner, Salt Revenue. <i>Madras.</i>
1878 Mar. 6.	R.	Adharlal Sen, B. A., Babu. <i>Calcutta.</i>
1860 July 4.	N.R.	Ahmad Khán Bahádur, Sayyid, c. s. i. <i>Aligarh.</i>
1872 April 3.	N.R.	Ahsan-ullah, Nawáb. <i>Dacca.</i>
1860 April 4.	N.R.	Aitchison, J. E. T., M. D., Surgeon-Major, 29th N. I. <i>Tulagong.</i>
1871 June 7.	N. R.	Alexander, J. W., Mayo College. <i>Ajmere, Rajpootana.</i>
1878 Mar. 6.	N.R.	Allen, G. W., 'C. I. E., <i>Pioneer Press, Allahabad.</i>
1874 June 3.	N.S.	Amír Alí, Sayyid, Barrister at Law.
1865 Jan. 11.	F.M.	Anderson, John, M. D., F. R. S., F. L. S., Superintendent, Indian Museum. <i>Europe.</i>
1875 June 2.	R.	Apear, J. G., Barrister at Law. <i>Calcutta.</i>
1875 Feb. 3.	N.R.	Armstrong, J., Surgeon, Beng. Army. <i>Marine Survey Department.</i>
1877 June 6.	R.	Arnold, Henry Kerchever Walter. <i>Calcutta.</i>
1877 July 4.	R.	Ashgar Ali Khán, Nawáb Diler Jang Bahadúr, c. s. i., <i>Calcutta.</i>
1871 Sept. 6.	N.R.	Atkinson, Edwin Felix, Thomas, B. A., c. s., Offg. Acet. General, N. W. P. <i>Allahabad.</i>
1869 Feb. 3.	N.R.	Attar Singh Bahádur, Sirdár, c. i. E., M. U. F., Chief of Bhadour. <i>Ludiana.</i>
1870 Feb. 2.	N.R.	Baden-Powell, Baden Henry, c. s., Conservator of Forests. <i>Lahore.</i>
1873 Aug. 6.	N.R.	Badgley, Major William Francis, s. c., Offg. Deputy Superintendent of Surveys. <i>Shillong.</i>
1862 Feb. 5.	R.	Baisák, Bábu Gaurdás, Depy. Magistrate. <i>Burisal.</i>
1865 Nov. 7.	F.M.	Ball, Valentine, M. A., F. G. S., Geol. Survey of India. <i>Geological Survey Office. Europe.</i>

Date of Election.			
1860 Nov. 1.	R.	Banerjea, Rev. Kristno Mohun, LL. D.	<i>Calcutta.</i>
1876 June 7.	R.	Baness, John Frederick, Chief Draftsman, Surveyor General's Office.	<i>Calcutta.</i>
1878 July 3.	N.R.	Barbe, H. L. St. c. s.	<i>Indore.</i>
1869 Dec. 1.	N.R.	Barker, R. A., M. A., Civil Surgeon.	<i>Bogra.</i>
1879 Aug. 28	N.R.	Barkley, D. G., M. A., c. s.	<i>Jullundur.</i>
1860 July 4.	R.	Batten, George Henry Maxwell, c.s., Barrister at Law.	<i>Calcutta.</i>
1859 May 4.	L.M.	Bayley, Edward Clive, The Hon. Sir, B. C. S., K. C. S. I., C. I. E.	<i>Europe.</i>
1878 June 5.	N.R.	Bayley, C. S., c. s.	<i>Raneegunge.</i>
1873 Feb. 5.	R.	Bayne, R. R., M. R. I. B. A., Draughtsman, Chief Engineer's Office, E. I. Railway.	<i>Calcutta.</i>
1864 Sept. 7.	N.R.	Beames, John, B.C.S., Magistrate and Collector.	<i>Hughli.</i>
1878 Sept. 25.	N.R.	Beighton, T. D., c. s., District and Sessions Judge.	<i>Beerbhoom.</i>
1862 Oct. 8.	R.	Bernard, Charles Edward, c. s., Secy. to the Govt. of India, Home, Rev. and Agril. Department.	<i>Calcutta.</i>
1872 Aug. 7.	R.	Beverley, Henry, M. A., c. s., Offg. District and Sessions Judge, 24-Pergunnahs.	<i>Calcutta.</i>
1876 Nov. 15.	N.R.	Beveridge, Henry, c. s., District and Sessions Judge.	<i>Patna.</i>
1878 Oct. 4.	R.	Bhakta, Babu Krishna Gopal.	<i>Calcutta.</i>
1879 Mar. 5.	N.R.	Biddulph, Major J., B. S. C., Officer on special duty.	<i>Gilgit, Kashmir.</i>
1875 July 7.	N.R.	Black, F. C., Asst. Engineer.	<i>Hamirpur, N. W. P.</i>
1873 Dec. 3.	R.	Blackburn, J., Manager, Oriental Gas Company.	<i>Calcutta.</i>
1857 Mar. 4.	L.M.	Blanford, H. F., A. R. S. M., F. G. S., Meteorological Reporter, Govt. of India.	<i>Calcutta.</i>
1859 Aug. 3.	F.M.	Blanford, W. T., A. R. S. M., F. R. S., F. G. S., Depy. Supdt., Geological Survey of India.	<i>Europe.</i>
1873 April 2.	N.R.	Blissett, T., Superintendent, Telegraph Storgs.	<i>Nagpur.</i>
1879 Aug. 28.	R.	Blyth, W. D., B.A., c.s., Magte., 24-Pergunnahs.	<i>Calcutta.</i>
1877 May 2.	R.	Bourdillon, James Austin, c. s., Offg. Inspector General of Registration.	<i>Calcutta.</i>
1876 Nov. 15.	N.S.	Bowie, Major M. M.	<i>Europe.</i>
1868 Jan. 15.	N.S.	Boxwell, John, c. s., Offg. Deputy Commissioner.	<i>Europe.</i>
1876 May 4.	N.R.	Bradshaw, Surgeon-Major A. F., Surgeon to the Commander-in-Chief.	<i>Sindh.</i>
1860 Mar. 7.	R.	Brandis, Dietrich, Ph. D., Inspector General of Forests.	<i>Calcutta.</i>
1872 June 5.	N.R.	Brooks, W. E., c. E., Supdg. Engineer, E. I. Railway.	<i>Muddapur.</i>
1879 Jan. 8.	R.	Browne, J. F., c. s., M. R. A. s., Offg. District and Sessions Judge, 24-Pergunnahs.	<i>Calcutta.</i>
1866 Nov. 7.	N.R.	Browne, Col. Horace Albert, Commissioner of Pegu.	<i>Rangoon.</i>

Date of Election.		
1871 Sept. 6.	N.R.	Buckle, H., Deputy Commissioner. <i>Tbunghoo, Burmah.</i>
1879 Mar. 5.	R.	Buckland, C. E., c. s. <i>Calcutta.</i>
1879 April 2.	R.	Calcutta, The Rt. Rev., the Lord Bishop of. <i>Calcutta.</i>
1869 Jan. 20.	N.R.	Cadell, Alan, B. A., c. s., Settlement Officer. <i>Banda.</i>
1873 Mar. 5.	R.	Cappel, A. J. L., Depy. Director General of Telegraphs. <i>Calcutta.</i>
1876 Nov. 15.	R.	Cayley, Surgeon-Major H., Surgeon, Mayo Native Hospital. <i>Calcutta.</i>
1875 April 4.	R.	Chambers, Dr. E. W. <i>Calcutta.</i>
1879 Nov. 5.	R.	Charles, T. E., M. D., F. R. C. P. <i>Calcutta.</i>
1861 Mar. 1.	N.R.	Chaudhuri, Bábu Harachandra, Zamindar. <i>Sherpur, Maímansingh.</i>
1874 Aug. 5.	N.S.	Chennell, A. W., Asst. Surveyor, Survey Dept. <i>Europe.</i>
1877 Aug. 30.	R.	Clarke, Capt. Henry Wilberforce, R. E., Depy. Consulting Engr., Govt. of India, for Guaranteed Railways. <i>Calcutta.</i>
1878 Feb. 6.	R.	Clarke, Colonel the Hon'ble Sir A., R. E., K. C. M. G., C. B., C. I. E. <i>Calcutta.</i>
1878 Mar. 6.	R.	Cockerell, The Hon'ble H. A. <i>Calcutta.</i>
1877 Mar. 7.	R.	Colvin, The Hon. Bazett Wetenhall, c. s., Member of the Governor-General's Council. <i>Calcutta.</i>
1874 Nov. 4.	N.R.	Constable, Archibald, Personal Asst. to Chief Engineer, Railway Dept. <i>Lucknow.</i>
1876 Mar. 1.	R.	Crawford, James, B. A., c. s., Barrister at Law, Registrar, High Court. <i>Calcutta.</i>
1877 June 6.	R.	Croft, A. W., M. A., Director of Public Instruction. <i>Calcutta.</i>
1874 Mar. 4.	N.R.	Crombie, Alexander, M. D., Civil Surgeon. <i>Dacca.</i>
1877 Feb. 7.	N.R.	Crooke, William, c. s., Offg. Joint Magistrate. <i>Gorakhpur.</i>
1873 Aug. 6.	R.	Cunningham, David Douglas, M. B., Special Asst. to the Sanitary Commissioner with the Govt. of India. <i>Calcutta.</i>
1847 June 2.	F.M.	Dalton, Major-General Edward Tuite, c. s. I., s. C. (retired). Queen Anne's Mansions, St. James's Park, S. W. <i>London.</i>
1873 Dec. 3.	N.R.	Dames, Mansel Longworth, c. s., Asst. Commissioner. <i>Rajanpur, Punjab.</i>
1877 June 6.	N.R.	Darbhanga Maharájá of. <i>Darbhanga.</i>
1865 June 7.	N.R.	Dás, Rajá Jaykissen, Bahádur, c. s. I. <i>Moradabad.</i>
1871 June 7.	R.	Dás, Bábu Ramkrishna. <i>Calcutta.</i>
1879 April 2.	N.R.	Dás, Bábu Ram Saran, M. A. <i>Fyzabad, Oudh.</i>
1869 April 7.	F.M.	Day, Dr. Francis, F. L. S., F. Z. S. <i>Europe.</i>
1856 June 4.	N.S.	DeBourbel, Lieut.-Col. Raoul, R. E. <i>Europe.</i>
1872 Aug. 7.	N.S.	Dejoux, P. <i>Europe.</i>
1869 Oct. 6.	N.R.	Delmerick, J. G., Extra Asst. Commissioner. <i>Amballa City.</i>

Date of Election.			
1873 Jan. 8.	N.R.	Dennys, H. L., Dist. Supdt. of Police.	<i>Sambalpur, C. P.</i>
1862 May 7.	N.R.	Dhanapati Singh Dughar, Rai Bahádur.	<i>Azimganj.</i>
1853 Sept. 7.	N.S.	Dickens, Major-General Craven Hildesley, B.A., C. S. I.,	<i>Europe.</i>
1870 May 4.	F.M.	Dobson, G. E., B. A., M. B., F.L. S.,	<i>Royal Victoria Hospital. Netley. Southampton.</i>
1875 Mar. 3.	N.R.	Dodgson, Walter.	<i>Rangpur.</i>
1878 May 2.	R.	Donaldson, P.	<i>Calcutta.</i>
1875 Mar. 3.	R.	Douglas, J., Offg. Supdt. of Telegraphs.	<i>Calcutta.</i>
1879 Feb. 5.	N.R.	Duthie, J. F., Superintendent, Govt. Botanical Gardens.	<i>Saharunpore.</i>
1873 Aug. 6.	R.	Dutt, Bábu Jogesh Chunder.	<i>Calcutta.</i>
1877 Aug. 30	N.R.	Dutt, Bábu Kedarnath, Personal Asst. to the Rajshahye Commissioner.	<i>Rampore Bauleah.</i>
1873 April 2.	R.	Dutt, Bábu Umesh Chunder.	<i>Calcutta.</i>
1870 Mar. 8.	L.M.	Edinburgh, H. R. H. The Duke of.	<i>Europe.</i>
1863 May 6.	N.R.	Edgar, John Ware, c. s., c. s. I., Offg. Magistrate and Collector.	<i>Shahabad, L. P.</i>
1879 Mar. 5.	R.	Eetvelde, Evan, Consul General for Belgium.	<i>Calcutta.</i>
1874 Dec. 2.	N.R.	Egerton, The Hon. Robert Eyles, c. s., K. C. S. I., c. I. E., Lieutenant-Governor of the Panjab.	<i>Lahore.</i>
1871 Dec. 2.	R.	Eliot, J., M. A., Meteorological Reporter to Govt. of Bengal.	<i>Calcutta.</i>
1871 Oct. 4	N.R.	Evezard, Col. G. E.	<i>Deesa, Gujarat.</i>
1859 Dec. 7.	R.	Fath Ali, Maulawí.	<i>Calcutta.</i>
1863 Jan. 15.	R.	Fedden, Francis, Asst., Geological Survey of India.	<i>Geol. Survey Office. Calcutta.</i>
1876 Jan. 5.	R.	Feistmantel, Ottokar, M. D., Palaeontologist, Geological Survey of India.	<i>Calcutta.</i>
1876 July 5.	N.R.	Foulkes, The Rev. Thos., Chaplain.	<i>Bangalore.</i>
1868 May 3.	N.R.	Field, Charles Dickenson, M. A., LL. D., c. s., Barrister at Law, District Sessions Judge.	<i>Burdwan.</i>
1879 July 2.	N.R.	Finucane, M., c. s., Settlement Officer.	<i>Darbhanga.</i>
1869 Sept. 1.	N.R.	Fisher, John Hadden, c. s., Depy. Commissioner.	<i>Jabalpur.</i>
1872 Dec. 4.	N.R.	Forbes, Major John Greenlaw, R. E., Supdg. Engineer, N. W. P. & Oudh Irrigation Branch.	<i>Lucknow.</i>
1869 Sept. 1.	N.R.	Fryer, Major G. E., Depy. Commissioner, Tavoy District.	<i>B. Burmah.</i>
1867 Sept. 4.	N.S.	Fyfe, The Rev. W. C., M. A., Principal, Free Church College.	<i>Europe.</i>
1873 Dec. 3.	N.R.	Gamble, J. S., B. A., Asst. to Inspector General of Forests.	<i>Darjiling.</i>
1871 Aug. 2.	N.R.	Gangaprasad, Munshi, Depy. Collector.	<i>Jaunpur.</i>
1874 July 1.	N.R.	Gardner, David Mason, c. s., Offg. Magistrate and Collector.	<i>Azamgarh.</i>

Date of Election.		
1879 Mar. 5.	N.S.	Garrett, A. W., M. A., Inspector of Schools, Presy. Circle. <i>Europe.</i>
1859 Aug. 3.	L.M.	Gastrell, Major-General James Eardley (retired). 7, <i>Langsowne Road, Wimbledon.</i>
1867 Dec. 4.	N.R.	Gay, E. M. A., C. S., Depy. Comptroller General. <i>Bombay.</i>
1877 Aug. 30.	R.	Ghosha, Bábu Jnanendra Chandra. <i>Calcutta.</i>
1871 May 3.	R.	Ghosha, Bábu Káliprasanna. <i>Calcutta.</i>
1877 Dec. 5.	N.R.	Ghosha, Dr. Krishna Dhana. <i>Rungpur.</i>
1869 Feb. 3.	R.	Ghosha, Bábu Pratápachandra, B. A. <i>Calcutta.</i>
1870 May 4.	R.	Ghoshál, Rájá Satyánand. <i>Calcutta.</i>
1875 July 7.	N.R.	Girdlestone, Charles Edward Ridgway, C. S. Resident. <i>Katmandu, Nepal.</i>
1861 Feb. 5.	F.M.	Godwin-Austen, Lieut.-Colonel H. H., F. Z. S., F. R. G. S. <i>United Service Club, St. James', London.</i>
1862 July 2.	N.R.	Gordon, Robert, C. E., Executive Engineer, P. W. D., <i>Henzada, B. Burmah.</i>
1869 July 7.	N.R.	Gordon, James Davidson, C. S., C. S. I., Offg. Chief Commissioner. <i>Mysore.</i>
1875 July 7.	N.S.	Gouldsbury, J. R. E. <i>Europe.</i>
1863 Nov. 4.	F.M.	Gowan, Major-General J. Y. <i>Woodlands, Wimbledon, London.</i>
1879 Jan. 8.	N.R.	Gowan, Capt. W. E., 21st Nat. Infy. <i>Kuram Valley.</i>
1877 Nov. 7.	L.M.	Grant, Alexander, M. I. C. E., Director of State Rail- ways. <i>Europe.</i>
1876 Nov. 15.	N.R.	Grierson, George Abraham, C. S., Offg. Joint Magis- trate. <i>Madhubani, Darbhanga.</i>
1861 Sept. 4.	N.R.	Griffin, Lepel Henry, B. C. S., Depy. Commissioner and Offg. Secy. to the Govt. of the Punjab. <i>Lahore.</i>
1878 May 2.	N.R.	Griffith, R. <i>Allahabad.</i>
1861 Feb. 6.	N.R.	Growse, Frederick Salmon, M. A., C. S., C. I. E., Joint Magistrate. <i>Bulandshahr, N. W. P.</i>
1875 Jan. 6.	N.S.	Gunn, John Sutherland, M. B., Surgeon, 4th Bengal Cavalry.
1867 July 3.	N.R.	Hacket, Charles Augustus, Asst., Geol. Survey of India.
1879 Mar. 5.	R.	Harraden, S. <i>Calcutta.</i>
1861 Feb. 2.	N.R.	Harrison, A. S., B. A., Principal, Muir Central College. <i>Allahabad.</i>
1877 Sept. 27.	R.	Hart, J., Attorney at Law. <i>Calcutta.</i>
1875 Mar. 3.	N.R.	Hendley, Dr. Thomas Holbein, Residency Surgeon. <i>Jaipur, Rájputáná.</i>
1879 Mar. 5.	N.R.	Herschel, Major J., Survey of India. <i>Dehra Dun.</i>
1875 Aug. 4.	N.R.	Hewitt, James Francis Katherinus, C. S., Commis- sioner. <i>Chota Nagpur.</i>
1872 Dec. 4.	R.	Hoernle, Rev. A. F. R., Ph. D., Cathedral Mission College. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Hoey, W. <i>Lucknow, Oudh.</i>

Date of Election.		
1873 Jan. 8.	L.M.	Houstoun, G. L., F. G. S. <i>Johnstone Castle, Renfrewshire, Scotland.</i>
1863 Jan. 15.	N.H	Howell, Mortimer Sloper, C. S., Joint Magistrate. <i>Hamirpur.</i>
1867 Aug. 7.	N.R	Hughes, T. H., A. B. S. M., F. G. S., Asst., Geol. Survey of India. <i>Kutni.</i>
1866 Jan. 17.	N.R.	Hughes, Captain W. G., M. S. C., Depy. Commissioner, Hill Tracts. <i>Arracan.</i>
1878 Sept. 25.	N.R	Hughes, G., C. S., Assistant Commissioner. <i>Montgomery, Panjab.</i>
1870 Jan. 5.	R.	Hume, Allan Octavian, C. B., C. S. <i>Calcutta.</i>
1872 Dec. 4.	N.R	Ibbetson, Denzil Charles Jelf, C. S., Asst. Commissioner. <i>Karnal, Panjab.</i>
1866 Mar. 7.	N.R	Irvine, William, C. S., Joint Magistrate. <i>Ghazipur.</i>
1871 Mar. 8.	N.S	Isaac, T. S., C. E. <i>Europe.</i>
1874 Feb. 4.	N.S.	Jackson, Surgeon Major Charles Julian. <i>Europe.</i>
1878 May 2.	R.	Jackson, The Hon'ble L. S., Judge, High Court. <i>Calcutta.</i>
1876 July 5.	N.R	Jarrad, Lieut. F. W., R. N., F. R. A. S., Depy. Superintendent, Marine Survey Dept.
1879 Mar. 5.	R.	Jarrett, Major H. S., B. S. C., Secy. to the Board of Examiners. <i>Calcutta.</i>
1879 Aug. 6.	F.M.	Joest, Herr W. <i>Cologne.</i>
1866 Feb. 7.	N.R.	Johnson, W. H., C. E., <i>Barrackpore.</i>
1862 Mar. 5.	N.R.	Johnstone, Major James William Hope, Offg. District and Sessions Judge. <i>Peshawar.</i>
1867 Dec. 4.	N.R.	Johnstone, Lieut.-Col. James, Political Agent. <i>Manipur, Assam.</i>
1878 Aug. 7.	N.R.	Johnstone, P. DeLacy, Depy. Commr. <i>Sialkote.</i>
1873 Dec. 3.	N.R.	Johore, H. H., Maharaja of, K. C. S. I. <i>New Johore, Singapore.</i>
1873 April 2.	N.R.	Jones, Frederick, C. S., Magistrate and Collector. <i>Tipperah.</i>
1875 Nov. 3.	N.R.	Jones, Samuel Simpson, B. A., C. S., Asst. Commissioner. <i>Rajmehal.</i>
1869 April 7.	R.	Kabiruddin Ahmad, Maulawi. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Kcene, G. H., C. S. <i>Agra.</i>
1874 Dec. 2.	N.R.	Khudabakhsh Khan, Maulawi. <i>Patna.</i>
1867 Dec. 4.	R.	King, G., M. B., F. L. S., Supdt., Royal Botanical Gardens. <i>Sibpur, Calcutta.</i>
1862 Jan. 15.	N.R.	King, W., Jr., B. A., F. G. S., Depy. Supdt. for Madras, Geol. Survey of India. <i>Geol. Surv. Office.</i>
1875 Dec. 1.	R.	Knight, Hon'ble J. B., C. I. E. <i>Calcutta.</i>
1877 Jan. 17.	N.R.	Kishor, Kumara Radha Deb, Juvraj of Hill Tipperah. <i>Tipperah.</i>

Date of Election.		
1877 Sept. 27.	N.R.	La Touche, James John Digges, B. A., C. S., Offg. Joint Magistrate. <i>Muttra.</i>
1878 Aug. 7.	N.R.	Lawrie, Dr. E. <i>Lahore.</i>
1879 Dec. 3.	N.R.	Leonard, G. S., Asst. Traffic Supdt., N. B. State Ry. <i>Saipur.</i>
1870 July 6.	N.S.	Lethbridge, E. Roper, M. A., C. I. E. <i>Europe.</i>
1879 Mar. 5.	R.	Levinge, H. C., C. E., Joint Secy. to the Govt. of Bengal, D. P. W. <i>Calcutta.</i>
1873 Feb. 5.	R.	Lewis, Timothy Richards, M. B., Special Asst. to Sanitary Commissioner with Govt. of India. <i>Calcutta.</i>
1864 Nov. 2.	R.	Locke, H. H., Principal, School of Art. <i>Calcutta.</i>
1866 Jan. 17.	N.R.	Low, James, Surveyor, G. T. Survey. <i>B. Burmah.</i>
1869 July 7.	N.S.	Lyall, Charles James, B. A., C. S., Under Secretary, Govt. of India, Home, Rev. and Agril. Dept. <i>Europe.</i>
1876 May 4.	R.	Lyall, John M., Messrs. Lyall, Rennie and Co. <i>Calcutta.</i>
1875 Jan. 6.	R.	Lydekker, Richard, Asst., Geol. Survey of India. <i>Geological Survey Office, Calcutta.</i>
1870 April 6.	L.M.	Lyman, B. Smith. <i>Japan.</i>
1866 June 6.	N.S.	Macdonald, Lieut.-Col. J., B. S. C., Depy. Superintendent of Surveys. <i>Europe.</i>
1876 Dec. 6.	N.R.	Macdonald, J. C., Supdt., Tarai District. <i>Nynee Tal.</i>
1879 Feb. 5.	N.R.	Macgregor, Lieut. C. R. <i>Shillong.</i>
1873 Dec. 3.	R.	McLeod, Surgeon-Major Kenneth, M. D., Secretary to the Surgeon-General, Indian Medical Dept. <i>Calcutta.</i>
1848 April 5.	L.M.	MacLagan, Major-General Robert, R.E., F.R.S.E., F.R.G.S. <i>Europe.</i>
1879 Aug. 28.	N.R.	Maconachie, R., C. S., Settlement Officer. <i>Delhi.</i>
1868 Dec. 2.	N.R.	Macauliffe, Michael, B. A., C. S., Depy. Commissioner. <i>Muzaffargarh, Punjab.</i>
1874 Jan. 7.	N.S.	Magrath, Charles Frederick, B. A., C. S., Joint Magistrate. <i>Europe.</i>
1867 April 3.	R.	Mainwaring, Lieut.-Col. George Byres, S. C. <i>Serampur.</i>
1876 Dec. 6.	N.S.	Malleson, Col. G. B., C. S. I. <i>Europe.</i>
1878 April 3.	N.S.	Mallet, F. R., Geological Survey of India. <i>Europe.</i>
1864 July 6.	R.	Mallik, Bábu Devendra. <i>Calcutta.</i>
1869 Sept. 1.	R.	Mallik, Bábu Yadulál. <i>Calcutta.</i>
1872 Nov. 6.	N.R.	Man, E. H., Asst. Supdt. <i>Port Blair, Andamans.</i>
1877 Dec. 5.	N.R.	Mandelli, L. <i>Darjeeling.</i>
1869 July 7.	N.R.	Markham, Alexander Macaulay, C. S., Offg. Magistrate and Collector. <i>Allahabad.</i>
1873 July 2.	N.R.	Marshall, C. W. <i>Gonatra, Synthea.</i>
1873 Aug. 6.	N.R.	Marshall, Lieut.-Col. William Elliot. <i>Ferozepore.</i>

Date of Election.		
1877 Feb. 7	R.	Marshall, Capt. Geo. Fred. Leycester, B. E., Asst. Secy., Govt. of India, P. W. D. <i>Calcutta.</i>
1876 Jan. 5	N.R	McGregor, W., Supdt. Telegraphs. <i>Dhubri, Assam.</i>
1860 Mar. 7	R.	Medlicott, H. B., M. A., F. R. S., F. G. S., Supdt., Geological Survey of India. <i>Calcutta.</i>
1877 Mar. 7	R.	Medlycott, The Rev. Adolphus Edwin, PH. D., 3, <i>Cullen Place, Howrah.</i>
1871 Sept. 6	N.R	Miles, Lieut.-Colonel S. B., s. c., Consul-General. <i>Bagdad.</i>
1870 July 6	R.	Miller, A. B., B. A., Barrister at Law, Official Assignee. <i>Calcutta.</i>
1874 May 6	N.R	Minchin, F. J. V. <i>Aska, Ganjam.</i>
1875 Aug. 4	N.S.	Minchin, Lieut.-Col. C. C., Political Agent and Supdt., Bahawalpur State. <i>Europe.</i>
1856 Mar. 5	R.	Mitra, Rājendralāla, Bābu, Rāi Bahādur, C. I. E., LL. D. <i>Calcutta.</i>
1876 Dec. 6	N.S.	Mockler, Major E., Political Agent. <i>Europe.</i>
1874 July 1	R.	Molesworth, G. L., c. e., Consulting Engineer to Govt. of India for State Railways. <i>Calcutta.</i>
1854 Dec. 6	R.	Morris, The Hon'ble George Gordon, B. C. S., Judge, High Court. <i>Calcutta.</i>
1878 May 2	R.	Moyle, J. C., Barrister at Law, High Court. <i>Calcutta.</i>
1864 Nov. 2	N.R	Mukerjia, Bābu Bhudeva, Inspector of Schools. <i>Chinsurah.</i>
1879 May 7	N.R	Muir, J. W., M. A., c. s., Barrister at Law. <i>Mainpuri, N. W. P.</i>
1867 Mar. 6	R.	Mukerjia, Bābu Pearimohan, M. A., Pleader, High Court. <i>Uttarpur.</i>
1876 May 4	R.	Nash, A. M., M. A., Professor, Presidency College. <i>Calcutta.</i>
1865 Feb. 1	R.	Nevill, G., c. M. z. s., Indian Museum. <i>Calcutta.</i>
1869 July 7	N.R.	Nursing Rao, A. V. <i>Vizagapatam.</i>
1871 July 5	N.R.	Oates, E. W., c. e., Engineer, P. W. D., Garrison Div., Sittang Canal. <i>Rangoon, Pegu.</i>
1879 Mar. 5	N.R.	O'Brien, E., c. s., Settlement Officer. <i>Muzaffargarh.</i>
1874 Oct. 4	R.	O'Kinealy, The Hon'ble James, c. s., District and Sessions Judge, 24-Pergannahs. <i>Calcutta.</i>
1879 Aug. 28	M.	Oldham, Surgeon-Major C. F., F. R. G. S., c/o Messrs. <i>Grindlay and Co. Calcutta.</i>
1873 Aug. 6	N.R.	Olpherts, W. J., c. e., Resident Engr., E. I. Railway. <i>Benares.</i>
1873 Aug. 6	R.	Ormerod, J. C., Custom House Agent. <i>Calcutta.</i>
1862 May 7	M.	Partridge, Surgeon-Major Samuel Bowen, M. D. <i>Europe.</i>
1879 Mar. 5	N.R.	Pawsey, R., c. s., Collector. <i>Cuttack.</i>
1871 Dec. 6	F.M.	Pearce, S. E., Manager, Sapakati Tea Estate. <i>Europe.</i>

Date of Election.		
1860 Feb. 1.	N.R.	Pearse, Lieut.-Col. G. G. <i>Bangalore.</i>
1873 Aug. 6.	R.	Pedler, Alexander, Professor of Chemistry, Presidency College. <i>Calcutta.</i>
1864 Mar. 2.	N.R.	Pellow, Fleetwood Hugo, c. s., Offg. Commissioner. <i>Dacca.</i>
1865 Sept. 6.	N.R.	Peppe, T. E. <i>Ranchi.</i>
1877 Aug. 1.	F.M.	Peters, C. T., M. B., Offg. Civil Surgeon. <i>Zanzibar.</i>
1868 May 6.	N.R.	Peterson, F. W., Bombay Mint. <i>Bombay.</i>
1835 July 1.	F.M.	Phayre, Lieut.-G., Sir Arthur Purves, K. C. S. I., C. B. <i>Mauritius.</i>
1875 Feb. 3.	N.R.	Porter, W., Asst. Supdt. of Police. <i>Akyab.</i>
1872 Dec. 4.	R.	Pránáth Sarasvati, Pandit, M. A., B. L. <i>Bhowanipur</i>
1878 Feb. 6.	R.	Prinsep, the Hon'ble H. T., Judge of the High Court <i>Calcutta.</i>
1874 Dec. 2.	N.S.	Protheroe, Major M. <i>Europe.</i>
1878 Aug. 29.	N.R.	Rangoon, Right Rev., Bishop of. <i>Rangoon.</i>
1877 May 2.	N.R.	Ravenshaw, Thomas Edw., c. s., Commissioner of Burdwan Division. <i>Chinsurah.</i>
1868 April 1.	N.R.	Rái, Rájá, Pramathanáth. <i>Digapati.</i>
1876 July 5.	R.	Raye, D. O'Connell, M. D., 1st Resdt. Surgeon, Presidency General Hospital. <i>Calcutta.</i>
1877 Aug. 1.	N.R.	Rees, J. C., Asst. Engr. P. W. D. <i>Thonzai, B. Burmah.</i>
1871 July 5.	N.S.	Reid, James Robert, c. s. <i>Europe.</i>
1872 April 3.	N.R.	Richards, Dr. Vincent. <i>Goalundo.</i>
1860 Jan. 3.	N.R.	Rivett-Carnac, John Henry, c. s., C. I. E., Opium Agent. <i>Ghazipur.</i>
1863 April 1.	N.R.	Robertson, Charles, c. s., Secretary to the Govt., N. W. P. and Oude. <i>Allahabad.</i>
1878 Sept. 25.	R.	Robertson, Rev. J., Principal, Doveton College. <i>Calcutta.</i>
1865 Feb. 1.	R.	Robinson, S. H. <i>Calcutta.</i>
1876 Dec. 6.	N.S.	Rodon, Lieut. G. S., Royal Scots. <i>Europe.</i>
1870 Jan. 5.	N.R.	Ross, Major Alexander George, Staff Corps, 2nd in Comd., 1st Sikh Infy. <i>Dera Ghazi Khan, Panjab.</i>
1877 May 2.	N.R.	Sandford, W., Assistant Traffic Manager, Nizam's State Railway. <i>Secunderabad, Deccan.</i>
1878 Jan. 2.	R.	Sawyer, Capt. H. A., Military Department. <i>Calcutta.</i>
1870 May 4.	N.R.	Schlich, Dr. W. <i>Darjiling.</i>
1879 May 7.	N.S.	Schroder, J. <i>Europe.</i>
1869 Feb. 3.	R.	Schwendler, L., Telegraph Store Department. <i>Calcutta.</i>
1879 Feb. 5.	R.	Sconce, Lt.-Col. J., B. S. C. <i>Calcutta.</i>
1876 July 5.	N.S.	Scott, Ross, c. s. <i>Europe.</i>
1874 July 1.	N.R.	Scully, Dr. John, Residency Surgeon. <i>Gilgit, Kashmir.</i>
1874 Dec. 2.	N.R.	Sen, Dr. Rám Dás. <i>Berhampur.</i>
1879 Jan. 8.	F.M.	Sewell, R., M. S. C. <i>Europe.</i>

Date of Election.		
1878 May 2.	N.S.	Sharpe, C. J. <i>Europe.</i>
1879 May 7.	N.R.	Sheridan, C. J., c. E. <i>Jhansi.</i>
1878 April 3.	R.	Simson, A. <i>Calcutta.</i>
1876 April 5.	R.	Singh, Kumara Kantichandra. <i>Calcutta.</i>
1878 Oct. 4.	N.R.	Singh, Rájá Lachman. <i>Bulanashahar.</i>
1869 Feb. 3.	N.R.	Singh, Giriprasád, Thákur. <i>Biswan Fort, Allighar.</i>
1853 Dec. 7.	N.R.	Singh, Rájá Isvariprasád, Bahádur. <i>Benares.</i>
1859 Aug. 3.	R.	Sinha, Bábu Balaichánd. <i>Calcutta.</i>
1877 Aug. 30.	N.R.	Singha, Pratápanaráyan, Deputy Magte. <i>Bankoor.</i>
1867 April 3.	R.	Sirkár, Dr. Mahendralála. <i>Calcutta.</i>
1872 Aug. 7.	N.R.	Skreftsrud, Rev. L. O., India Home Mission to the Santhals. <i>Dumka, Santhal Pargunnahs.</i>
1864 Sept. 7.	N.S.	Sladen, Lieut.-Col. E. B., m. s. c., Commissioner, Arracan Division. <i>Europe.</i>
1875 Feb. 3.	N.S.	Smidt, John. <i>Europe.</i>
1865 July 5.	R.	Smith, David Boyes, m. d., Medical College. <i>Calcutta.</i>
1874 June 3.	N.R.	Smith, Vincent Arthur, c. s., Asst. Settlement Officer. <i>Ilamirpur, N. W. P.</i>
1879 Mar. 5.	R.	Someren, Capt. G. J. van. <i>Calcutta.</i>
1878 Mar. 6.	R.	Souttar, W. M., Chairman of the Corporation <i>Calcutta.</i>
1877 April 4.	N.R.	Spens, The Rev. A. N. W., Chaplain. <i>Sialkot.</i>
1872 July 3.	N.R.	Stephen, Carr, B. L., Judl. Asst. Commr. <i>Ludianah.</i>
1879 Oct. 2.	R.	Sterndale, R. A., F. R. G. S., Asst. Comr. of Currency. <i>Calcutta.</i>
1875 July 7.	R.	Stewart, M. G. <i>Calcutta.</i>
1876 Aug. 2.	N.R.	St. John, Major Oliver Beauchamp, R. E., c. s. I., Frontier Expeditionary Force. <i>Quetta Column.</i>
1861 Sept. 4.	R.	Stokes, The Hon'ble Whitley, c. s. I., c. I. E. <i>Calcutta.</i>
1869 Feb. 3.	R.	Strachey, The Hon'ble Sir J., K. C. S. I., C. I. E. <i>Calcutta.</i>
1859 Mar. 2.	N.R.	Stubbs, Lieut.-Col. Francis William, Royal Artillery. <i>Lucknow.</i>
1864 Aug. 11.	R.	Swinhoe, W., Attorney-at-Law. <i>Calcutta.</i>
1871 Mar. 1.	R.	Tagore, Bábu Dvijendranath. <i>Calcutta.</i>
1871 Jan. 4.	R.	Tagore, Bábu Gunendranath. <i>Calcutta.</i>
1868 June 3.	R.	Tagore, The Hon'ble Jotendra Mohun, c. s. I., Ma- haraja. <i>Calcutta.</i>
1865 Sept. 6.	R.	Tawney, C. H., m. A., Principal, Presidency College. <i>Calcutta.</i>
1865 April 5.	N.S.	Taylor, R., c. s. <i>Europe.</i>
1874 Mar. 4.	R.	Taylor, Commander A. D., late Indian Navy. <i>Calcutta.</i>
1860 May 2.	N.R.	Temple, The Hon. Sir R., Bart., K. C. S. I., C. I. E., B. C. S. <i>Bombay.</i>
1878 June 5.	N.R.	Temple, Lieut. R. C., s. c., Cantonment Magte. <i>Fes- pore, Punjab.</i>
1876 Feb. 2.	R.	Tennant, Col. James Francis, R. E., F. R. S., C. I. E., Mint Master. <i>Calcutta.</i>
1875 June 2.	N.R.	Thibaut, Dr. G., Prof. Sanskrit College. <i>Benares.</i>
1869 Oct. 6.	N.R.	Thomson, A., The College, <i>Agra.</i>

Date of Election.		
1875 Nov. 3.	N.R.	Thomson, Robert George, c. s., Asst. Cominr. <i>Jhelum, Punjab.</i>
1847 June 2.	L.M.	Thuillier, Major-Genl. Henry Edward Landor, R. A., c. s. I. & F. R. S. <i>Care of Messrs. Grindlay and Co., 55, Parliament St., London.</i>
1865 July 5.	N.S.	Tolbort, Thos. Wm. Hooper, c. s., Offg. Deputy Commissioner. <i>Gujranwala.</i>
1871 April 5.	F.M.	Treffitz, Oscar. <i>Care of Messrs. E. D. Keilhorn and Co., 16, St. Mary Axe, London.</i>
1861 June 5.	L.M.	Tremlett, James Dyer, M. A., c. s. <i>Europe.</i>
1872 July 3.	N.S.	Trevor, Lieut.-Col. William Spottiswoode, R.E. <i>Europe.</i>
1873 April 6.	R.	Turhbull, Robert, Secretary to the Corporation. <i>Calcutta.</i>
1863 May 6.	N.R.	Tyler, J. W., M. D., F. R. C. S., Supdt., Central Prison. <i>Agra.</i>
1869 Aug. 4.	R.	Wáhid Akí, Prince Jahán Qadr Muhammad, Bahádur. <i>Garden Reach.</i>
1865 Nov. 1.	R.	Waldie, David, F. C. S. <i>Calcutta.</i>
1861 May 1.	R.	Walker, Major-Genl. James T., R. E., C. B., F. R. S., Surveyor General of India. <i>Calcutta.</i>
1875 April 7.	N.S.	Wall, Dr. Alfred John. <i>Europe.</i>
1863 Oct. 7.	R.	Waller, Walter Kerr, M. B. <i>Calcutta.</i>
1865 May 3.	F.M.	Waterhouse, Major James, B. S. C., Dy. Supdt., Survey of India. <i>Europe.</i>
1874 July 1.	N.R.	Watt, Dr. George, Professor, Hughli College. <i>Chinsurah.</i>
1876 Dec. 6.	N.S.	Webb, W. T., M. A., Prof., Dacca College. <i>Europe.</i>
1879 Mar. 5.	N.R.	Weckes, A., c. s., Collector. <i>Chumprun.</i>
1869 Sept. 1.	R.	Westland, James, c. s., Accountant General. <i>Calcutta.</i>
1867 Feb. 6.	N.S.	Westmacott, Edward Vesey, B. A., c. s. <i>Europe.</i>
1862 Oct. 8.	N.S.	Wheeler, James Talboys. <i>Europe.</i>
1878 Aug. 29.	N.R.	Wheeler, P. C., c. s., Asst. Magistrate. <i>Ghazipur.</i>
1878 Sept. 25.	R.	White, The Hon'ble J. Sewell, Judge, High Court. <i>Calcutta.</i>
1875 Feb. 3.	N.R.	Whiteway, Richard Stephen, c. s., Asst. Settlement Officer. <i>Muttra.</i>
1878 Aug. 29.	N.R.	Whittall, R., Forest Dept. <i>Toungoo, British Burmah.</i>
1873 May 7.	N.R.	Williams, George Robert Carlisle, B. A., c. s., Offg. Joint-Magte. and Collr. in charge of Ballia. <i>Ghazipur.</i>
1867 Jan. 16.	N.R.	Williamson, Capt. William John, Inspr. Genl. of Police. <i>Shillong, Khasi Hills.</i>
1870 Aug. 3.	N.R.	Wilson, Robert Henry, B. A., c. s., Offg. Secy. to Board of Revenue. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Wilson, J. <i>Gurgaon, Punjab.</i>
1866 Mar. 7.	L.M.	Wise, Dr. J. F. N. <i>Rostellan, County Cork. Ireland.</i>
1867 July 3.	N.R.	Wood, Dr. Julius John, Supdt. of Vaccination. <i>Ráncchi.</i>

Date of Election.		
1870 Jan. 5.	R.	Wood-Mason, James, Offg. Supdt., Indian Museum. <i>Calcutta.</i>
1873 Aug. 6.	N.R.	Woodthorpe, Capt. Robert Gossett, R. E., Asst. Supdt., Survey of India. • <i>Frontier Expeditionary Force.</i> <i>Kurm Valley Column.</i>

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### HONORARY MEMBERS.

1821 Mar. 6.		Sir John Philkippart. <i>London.</i>
1826 July 1.		Count de Noe. <i>Paris.</i>
1834 May 6.		Professor Isaac Lea. <i>Philadelphia.</i>
1847 Sept. 1.		Col W. Munro. <i>London.</i>
1847 Nov. 3.		His Highness the Nawáb Nazim of Bengal. <i>Europe.</i>
1848 Feb. 2.		Dr. J. D. Hooker, R. N., F. R. S. <i>Kew.</i>
1853 April 6.		Major-Gen. Sir H. C. Rawlinson, K. C. B. <i>London.</i>
1858 July 6.		B. H. Hodgson. <i>Europe.</i>
1859 Mar. 2.		The Hon'ble Sir J. W. Colville, Kt. <i>Europe.</i>
1860 „ 7.		Professor Max Müller. <i>Oxford.</i>
1860 Nov. 7.		Edward Thomas. <i>London.</i>
1860 „ 7.		Dr. Aloys Sprenger. <i>Bern.</i>
1860 „ 7.		Dr. Albrecht Weber. <i>Berlin.</i>
1868 Feb. 5.		General A. Cunningham, C. S. I. <i>India.</i>
1868 „ 5.		Professor Bápu Déva Sástri. <i>Benares.</i>
1868 „ 2.		A. Grote. <i>London.</i>
1871 „ 7.		Charles Darwin. <i>London.</i>
1872 „ 1.		Sir G. B. Airy. <i>London.</i>
1872 June 5.		Professor T. H. Huxley. <i>London.</i>
1875 Nov. 3.		Dr. O. Böhtlingk. <i>Jena.</i>
1875 „ 3.		Professor J. O. Westwood. <i>Oxford.</i>
1876 April 5.		Col. H. Yule, R. E., C. B. <i>London.</i>
1876 „ 5.		Dr. Werner Siemens. <i>Berlin.</i>
1877 Jan. 17.		Dr. John Muir. <i>Edinburgh.</i>
1879 June 4.		Prof. E. B. Cowell, D. C. L. <i>Cambridge.</i>
1879 „ 4.		Dr. A. Günther, V. P. R. S. <i>London.</i>
1879 „ 4.		Dr. J. Janssen. <i>Paris.</i>
1879 „ 4.		Prof. H. Milne-Edwards. <i>Paris.</i>
1879 „ 4.		Prof. P. Regnaud. <i>Lyons.</i>
1879 „ 4.		M. E. Renan. <i>Paris.</i>

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### CORRESPONDING MEMBERS.

1844 Oct. 2.		Macgowan, Dr. J. <i>Europe.</i>
1856 June 4.		Krämer, Herr A. von. <i>Alexandria.</i>
1856 „ 3.		Porter, Rev. J. <i>Damascus.</i>
1856 „ 4.		Schlagintweit, Herr H. von. <i>Munich.</i>

1856 June. 1.	Smith, Dr. E.	<i>Beyrout.</i>
1859 „	Tailor, J., Esq.	<i>Bussorah.</i>
1857 Mar.	Nietner, J., Esq.	<i>Ceylon.</i>
1858 „	Schlagintweit, Herr R. von.	<i>Giessen.</i>
1859 Nov.	Frederick, Dr. H.	<i>Batavia.</i>
1860 Feb.	Baker, The Rev. H.	<i>E. Malabar.</i>
1861 July 3.	Gösche, Dr. R.	
1862 Mar. 3.	Murray, A., Esq.	<i>London.</i>
1863 July	Barnes, R. H., Esq.	<i>Ceylon.</i>
1866 May	Schlagintweit, Prof. E. von.	<i>Munich.</i>
1866 „	Sherring, Rev. M. A.	<i>Benares.</i>
1868 „	Holmböo, Prof.	<i>Christiania.</i>

#### ASSOCIATE MEMBERS.

1865 May 3.	Dall, Rev. C. H.	<i>Calcutta.</i>
1874 Feb. 4.	Schaumburgh, J., Esq.	<i>Calcutta.</i>
1874 April 1.	Lafont, Rev. Fr. E., S. J., C. I. E.	<i>Calcutta.</i>
1875 Dec. 1.	Bate, Rev. J. D.	<i>Allahabad.</i>
1876 „ 1.	Maulawī Abdul Hai,	<i>Madrasah. Calcutta.</i>

#### LIST OF MEMBERS WHO HAVE BEEN ABSENT FROM INDIA THREE YEARS AND UPWARDS.\*

\* *Rule 40.*—After the lapse of 3 years from the date of a Member leaving India, if no intimation of his wishes shall in the interval have been received by the Society, his name shall be removed from the list of Members.

The following Members will be removed from the next Member List of the Society under the operation of the above Rule.

J. Smidt, Esq. ....	1876.
R. Taylor, Esq. ....	1877.

#### LOSS OF MEMBERS DURING 1879.

##### BY RETIREMENT.

A. H. Anthony, Esq.	<i>Calcutta.</i>
Lt.-Col. E. G. Clark.	<i>Sultanpur.</i>
W. Duthoit, Esq.	<i>Shahjehanpur.</i>
Bābu Uday Chand Dutt.	<i>Serampur.</i>
Major W. R. M. Holroyd.	<i>Punjab.</i>
W. Mackay, Esq.	<i>Nusseerabad.</i>
R. Parry, Esq.	<i>Calcutta.</i>
H. S. Reid, Esq.	<i>Allahabad.</i>
Major W. L. Samuells.	<i>Lohardugga.</i>
E. White, Esq.	<i>Allahabad.</i>
I. J. Whitty, Esq.	<i>Giridhi.</i>
C. H. Wood, Esq.	<i>Calcutta.</i>
A. Wilson, Esq.	<i>Calcutta.</i>
A. Smidt, Esq.	<i>Calcutta.</i>

BY DEATH.

*Ordinary Members.*

Nawáb Amir Alí Khán Bahádur. *Calcutta.*  
 R. S. Brough, Esq. *Calcutta.* ;  
 G. H. Damant, Esq. *Naga Hills.*  
 R. B. Shaw, Esq. *Mandalay.*  
 H. C. Sutherland, Esq. *Backergunge.*  
 Mahárájáh Mirza Vijayanagram. *Benares.*  
 G. Robb, Esq. *Calcutta.*  
 F. L. Beaufort, Esq. *London.*  
 F. Wilcox, Esq. *Manbhum.*  
 Capt. C. J. F. Forbes. *B. Burmah.*

*Honorary Members.*

Prof. Henry. *Princeton, U. S.*  
 M. Stanislas Julien. *Paris.*

BY REMOVAL.

*Under Rule 10.*

Surg.-Maj. J. Ewart.  
 Lt.-Col. J. G. Forlong.  
 G. W. Hoyle, Esq.  
 Dr. W. W. Hunter.  
 Col. H. Hyde. •  
 Sir W. Muir. •  
 Lord Napier of Magdala.  
 Isaac Newton, Esq.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MARCH, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 3rd instant, at 9 P. M.

DR. RĀJENDRALĀLA MITRA, Vice-President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Home, Revenue and Agricultural Department,—(1) Selections from the Records of the Government of India, Home, Revenue and Agricultural Department, Nos. CLIX and CLX, (2) The Stūpa of Bharhut: by Major General A. Cunningham, (3) A Comparative Grammar of the Modern Aryan Languages of India. Vol. III. The Verb: by J. Beames, and (4) Hindu Tribes and Castes. Vol. II: by Rev. M. A. Sherring.
2. From the British Museum,—Descriptions of new species of *Hymenoptera* in the collection of the British Museum; by Frederick Smith.
3. From the K. Institut voor de Taal-Land-en Volkenkunde van Nederl. Indië,—Reizen naar Nederlandsch Nieuw Guinea in de jaren 1871, 1872, 1875-76; by P. J. B. C. Robidé van der Aa.
4. From the Government, N. W. P.,—(1) Statistical, Descriptive and Historical account of the North West Provinces of India. Vol. V. Rohilkhand Division, Part I: by H. C. Conybeare, edited by E. T. Atkinson, (2) List of Sanskrit MSS. discovered in Oudh during the year 1879: by Pandit Devi Prasad.
5. From the Translator,—Vikramorvaṣi, ourvaṣi donnée pour prix de l'héroïsme: drame en cinq actes de Kalidasa. Traduit du Sanscrit par Ph. Ed. Foucaux.
6. From the Nantisk Meteor. Byran i Stockholm,—(1) Instruktion för Meteorologiska Observationers Utförande vid Svenska Fyrstationer, (2)

Instruktion för Meteorologisk Loggboks Förande, (3) Instruktion för Hydrographiska Observationers ut Förande vid Svenska Fyr-och Lots-Stationer.

7. From the K. K. Geol. Reichsanstalt in Wien,—Zur Kenntniss der Fauna des untersten Lias in den Nordalpen : by Dr. M. Neumayr.

8. From the Authors:—(1) Report on the miscellaneous old Records of the India Office, Nov. 1st 1878 : by Dr. G. Birdwood. (2) Sanskrit Wörterbuch in kürzerer Fassung. Erster Theil. Die vocale : by Otto Böhtlingk, (3) Morphological notes bearing on the origin of Insects : by J. Wood-Mason, (4) Essays on the Language, Literature and Religion of Nepál and Tibet : by B. H. Hodgson.

9. From the Marine Survey Department,—List of Light-Houses and Light-Vessels in British India : by R. C. Carrington.

10. From the St. Xavier's College Observatory,—A Statement of the Results of the Observations made from July to December, 1879.

11. From the Muséum d'Histoire Naturelle de Lyon,—Recherches sur les mastodontes et les faunes mammalogiques qui les accompagnent : by Dr. Lortet and E. Chantre.

12. From the K. Akademie der Wissenschaften in Wien,—Zweite Abhandlung über die Wasserabnahme in den Quellen, Flüssen und Strömen : by Gustav Ritter von Wex.

13. From the Secretary of State for India,—The Bondage and Travels of Johann Schiltberger : by Commander J. B. Telfer.

The following Gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

Lieut. R. C. Tufnell.

A. C. Carlleyle, Esq.

Ramesvar Maliah, Esq.

The following Gentlemen are candidates for ballot at the next Meeting—

1. W. Fiddian, Esq., Rampur Beaulieu, proposed by E. V. Westmacott, Esq., seconded by J. Crawford, Esq.

2. N. Elias, Esq., proposed by H. B. Medlicott, Esq., seconded by R. Lydekker, Esq.

3. Bábu Bipina Chanára Rai, proposed by Dr. Rájendralála Mitra, seconded by Bábu Prátápa Ch. Ghosha.

4. Ananda Ráma Gajapati, Rájá of Vizianagram, proposed by Rájá Satyánanda Ghoshál, seconded by Moulvie Abdul Latif Khán Bahadur.

The SECRETARY reported that Major W. R. M. Holroyd had requested that his withdrawal might be cancelled.

The SECRETARY read the names of the following Gentlemen appointed

by the Council to serve on the several Committees during the ensuing year:—

FINANCE COMMITTEE.

J. Westland, Esq., C. S.  
Dr. Rájendralála Mitra, C. I. E.  
J. C. Douglas, Esq.  
H. Beverley, Esq., C. S.

LIBRARY COMMITTEE.

Dr. Rájendralála Mitra, C. I. E.  
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Major-General J. T. Walker, F. R. S.  
Dr. D. D. Cunningham.  
Dr. W. K. Waller.  
A. W. Croft, Esq., M. A.  
C. H. Tawney, Esq., M. A.  
Hon'ble Whitley Stokes, C. S. I., C. I. E.  
Bábu Prannath Pandit, M. A.  
H. F. Blanford, Esq., A. R. S. M., F. G. S.  
G. Nevill, Esq.  
Dr. O. Feistmantel.  
J. Eliot, Esq., M. A.  
A. Pedler, Esq.  
H. Beverley, Esq., C. S.  
Dr. Mohendralála Sircár.  
J. C. Douglas, Esq.  
Bábu Protápa Chandra Ghosha, B. A.  
Dr. T. R. Lewis.

PHILOLOGICAL COMMITTEE.

Dr. Rájendralála Mitra, C. I. E.  
C. H. Tawney, Esq., M. A.  
Major-General A. Cunningham, C. S. I.  
J. Beames, Esq., B. C. S.  
F. S. Growse, Esq., M. A., C. S., C. I. E.  
Rev. K. M. Banerjea, LL. D.  
Babu Gaur Dás Bysack.  
Dr. Mohendralála Sircár.  
Hon'ble J. O'Kinealy, C. S.  
Hon'ble Whitley Stokes, C. S. I., C. I. E.  
Dr. G. Thibaut.

H. Rivett-Carnac, Esq., C. S., C. I. E.  
 Moulvie Abdul Latif Khán, Bahádur.  
 Moulvie Kabiruddin Ahmad.  
 Babu Dijendranath Thakur.  
 Bábu Prannath Pandit, M. A.  
 Babu Protápa Chandra Ghoshia, B. A.  
 Captain H. W. Clarke, R. E.  
 Major H. S. Jarrett.  
 J. F. Browne, Esq., C. S.

#### NATURAL HISTORY COMMITTEE.

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 Dr. J. Armstrong.  
 Dr. G. King.  
 Dr. W. Schlich.  
 Dr. D. Brandis.  
 S. E. Peal, Esq.  
 W. E. Brooks, Esq., C. E.  
 R. Lydekker, Esq., B. A.  
 Capt. G. F. L. Marshall, R. E.  
 Lieut. F. W. Jarrad, R. N.  
 L. Schwendler, Esq.  
 Dr. T. R. Lewis.

#### PHYSICAL SCIENCE COMMITTEE.

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 Dr. O. Feistmantel.  
 R. Lydekker, Esq., B. A.  
 Hon'ble J. O'Kinealy, C. S.  
 J. C. Douglas, Esq.  
 F. Fedden, Esq.

## COINS COMMITTEE.

Dr. Rájendralála Mitra, C. I. E.

Col. J. F. Tennant, F. R. S.

Rev. M. A. Sherring.

Major-General A. Cunningham, C. S. I.

Col. F. W. Stubbs.

H. Rivett-Carnac, Esq., C. S.

DR. HOERNLE exhibited 12 Arakan coins, two of which belong to the Phayre Museum in Rangoon, and ten to the Indian Museum in Calcutta. They are described in the following note by Dr. Rájendralála Mitra.

Coins of this class were first brought to the notice of the Society by Capt. J. Latter in 1846. Four specimens were then figured and described (*Journal*, Vol. XV, plate III), two of which bore no inscription, and the inscriptions on the other two were not read. Capt. Latter called them 'Symbolical coins of Arakan.' In 1872, Capt. Fryer obtained two other specimens, and, in the note which he communicated to the Society on them, (*Journal*, XLI, pp. 201 f) he described them as belonging to the Vaisáli dynasty of Arákán. The inscriptions on them and on Capt. Latter's coins were read by Bábu Pratápachandra Ghosha. One he read *Dharmachandra*, another *Srí-ta-chandra* and a third *Srí-vikrama*. All these coins had a couchant bull on the obverse, and a conventional trident (*trisúla*) on the reverse. In 1878, Mr. Blochmann obtained from the Phayre Museum at Rangoon, five specimens of this class of money, bearing on the obverse a conch-shell, instead of the couchant bull, and I read the name on them to be Vijaya, taking Bábu Pratápachandra Ghosha's reading of *Srívikrama* to be erroneous. The first name I took to be correct, but I could make nothing of the second (*Proceedings* for 1878, pp. 102-3.) The several specimens now obtained enable me to settle its reading and also to supply a new name. The first letter on No. 1 of the Phayre Museum specimens is unquestionably *Srí*, as read by Bábu Pratápachandra Ghosha. It is pronounced by the Arákánese and the Burmese as a word of two syllables, *Síri*. The second letter, read *ti* by Bábu Pratápachandra Ghosha, appears in most of the specimens like *te*, for the mark for *i* is generally left slanting upwards and backwards, whereas that for *e* is curved downwards, and this downward curvature is distinct on some specimens. A dot over the *t* is also perceptible, and that makes the word *teñ*. The last word *Chandra* is unquestionable. The result is *Srí-teñ-chandra*, and this is the name of the seventh prince of the Vaisáli dynasty of Arákán. In the Burmese style the name is written *Siri taing chandra*. The prince lived, according to Capt. Fryer, in A. D. 903. The letters of the name are of about this date, i. e., the Gupta type merging into the Kuṭila.

The letters on No. 2 of the Phayre Museum and on most of the Indian Museum specimens are older, being somewhat like the old Pálí\* of the Lat inscriptions. They are also fairly legible, except the first, which is very like a *t*, but I think it is intended for an *s*. Reading it as *t* the name would be *tari kádu*, and as *s*, *Siri-kádu*. The last is what I take to be the right reading, for it corresponds with the name of the second rájá of the Arákán kings as given in Mr. Paton's list, published in the XVIth Volume of the *Researches*. The name there is written Sorea kádu, and the prince is said to have lived in A. D. 755 = Mug era 117.

Of Vijaya and Dharma-chandra I have not been able to find out the dates; but from the character used on their coins I infer that they must have lived between the dates of Kádu and Teñ-chandra. The *j* of Vijaya is of an older type than the *dh* of Dharma-chandra. Arranged chronologically, Sirikádu comes in 755 A. D.; Vijaya after him, some generations removed; Dharma-chandra third, again some unknown generations removed; and Siri-teñ-chandra in 903 A. D.

Dr. Hoernle remarked, with regard to this note, that the date assigned to Siri kádu which was based on a comparison of the Mug era with the Christian, appeared to be doubtful, as the form of the letters on his coins seems to be of a much older type, *viz.*, of the 2nd or 3rd century, A. D.

Dr. HOERNLE exhibited the Rubbing of a Persian Inscription from Kashmir, sent by Mr. A. Constable, who writes that the inscription is on a slab of black slate, well polished and finished, measuring  $21\frac{1}{2}$  by 12 by  $2\frac{1}{2}$  inches. He found the slab lying on the ground near the ruins of a Musjid on "Lanka Island," in the Woollar Lake in Kashmir. The copy was taken in September 1874. The Inscription is as follows :

این بقعه چو بنیان فلک محکم باد      مشهور بزین دیب در عالم باد  
شه زین عباد تا در و جشن کند      پدوسته چو تاریخ خودش نغم باد

Major Jarrett in a note which was read to the meeting, translates it :—

"May this edifice be as firm, as the foundations of the Heavens,  
May it be the most renowned ornament of the Universe,  
As long as the Monarch Zayn Ibád holds festival therein,  
May it be like the date of his own reign—happy."

The word, translated "happy," is in the original, *Khuram*, the numerical value of the letters of which is 847, meaning that year of the Hijra era, equal to A. D. 1443-4. At that time Zayn Ibád or, as he is commonly

\* The Pálí letters, as constituents of a classical alphabet associated with the Pálí religious books, and not used for the ordinary affairs of every-day life, were not subject to those influences which lead to deterioration, and therefore retained their primitive forms longer in Burmah than elsewhere.—R. M.

called, Zayn ul Aâbidin was ruler of Kashmir. He was a son of Sultân Sikandar, and succeeded his brother Âli on the throne of Kashmir in A. H. 828 or A. D. 1424-5. In earlier life he had been, for some years, a captive of Timur in Samarkand, from whence, on his return, he introduced various new industries in his own country. His reign was a prosperous and peaceful one. He artificially constructed the island of Lanka in the Woolar lake and built a mosque on it. On the completion of Lanka, the king ordered a great festival to be held. Verses were written by the poets to commemorate this event, and among these the inscription under notice by Ahmad Allâmah Kashmîrî was engraved upon a stone and placed above the Mihrâb, or Sanctuary of the Mosque.

This inscription, together with Major Jarrett's note, will be published in the Journal, Part I.

Dr. HOERNLE exhibited an eye-copy of a Pâli rock-cut inscription sent by Mr. A. M. Markham, Collector of Allahâbâd, and discovered by him in a cave near the falls of Keoti Kuṇḍa on the river Mahânâ, a tributary of the Tanwas or "Tonse" in the Riwa State. The inscription is as follows :

हरिती पुतेषां सानकेन कारिता पुष्करिणी

and means: "the Pool-cave caused to be made by Saunaka the son of Haritî." The cave takes its name "Pool" from a very picturesque natural pool, excavated by the fall of the Mahânâ river, which precipitates itself over a perpendicular drop of 336 feet, unbroken even by a crag. In another cave, near another somewhat similar fall, there are said to be several square yards of very well painted figures and hunting and battle scenes, in a rather bright red.

The following papers were read—

# 1. *Zoological Notes.*—By L. SCHWENDLER.

The very successful trial of punkha-pulling by means of compressed air, which I had an opportunity of witnessing on the 27th January 1880, at Fort William, Calcutta, where my friend the Honorable C. E. Parsons has introduced his ingenious invention in the Dalhousie Barracks; and my own endeavours to devise a practical method for pulling Pankhas, viz., by the transmission of power conveyed by the electric current as produced by the present dynamo-electric machines,\* reminded me again of an interesting fact which I was told some years ago, i. e., that the Langur monkeys of India (*Semnopithecus Entellus*), if the necessary trouble is taken, could be made useful and cheap substitutes for the ordinary punkha-coolies at present generally in use in India.

\* Philosophical Magazine (Supplement), December 1879, and Part II of the Journal, Asiatic Society of Bengal, 1879.

My trustworthy informant, Bábu B. Pyne, a member of the Government Telegraph Department, kindly placed at my disposal the following statement on the subject. The Babu says:—

"Some years ago I had a Langur which, when standing erect, measured fully 2' 6." The animal was very powerful, and could easily pull a punkha measuring 8' in length. It was a male, and, even when young, showed a disposition to be highly savage. The older he got the more savage he became. Seeing the great power this monkey had, I wanted to utilize it, and therefore intended to employ him for the purpose of pulling punkhas. The teaching I effected in the following manner:—the monkey was tied by the waist close to a strong pole, so that it could not move either backwards or forwards, or right or left. Both hands were tied to a rope attached to a punkha which was regularly pulled from the other side by a man. Thus the animal had to sit in one place, and could only move its hands up and down with the punkha rope.

"In this way the monkey, in a comparatively short time, learnt to pull the punkha by himself, and was so employed by me for several years. He always kept in first rate health, enjoyed his work immensely, and did it equally well, if not better, than a cooly. During the rains he suffered from fever and ultimately died. Putting now this trained monkey in the place where the man used to pull the punkha, and a new Langur in the place where the trained monkey formerly sat, I attempted to teach successively *four* more monkeys, two of which were females. I succeeded perfectly in teaching the males, but was quite unsuccessful with the females."

I thought this might be of interest to the Society, since it appears to me the first authentic record of the power of a monkey having been employed for doing *useful work*. There is a certain amount of intelligence required to do this work, since the arms, in their up and down movements, have to keep 'time with the swinging punkha.

When the reading of the above paper was concluded, Mr. Schwendler mentioned some other instances in which the display of intelligence by monkeys had been noticed. In particular, he mentioned a case in which a monkey, which had sustained a fall from trusting to a rotten branch while swinging on a tree, had been observed afterwards to examine the branches of the tree, and to break off those which it found to be rotten. Some discussion ensued as to whether the action of the monkey in this case was the result of intelligence, and some of the members present were of opinion that it might have been the result simply of anger caused by the fall. Mr. Schwendler, however, stated that he had for long made the habits of animals a study, and that he was convinced of the fact that monkeys were possessed of much intelligence; and he vouched for the authenticity of the statements made in the paper read regarding the monkeys which were taught to pull a punkha.

2. *Remarks on the Afghans found along the Route of the Tal Chotiali Field Force, in the Spring of 1879.*—By LIEUT. R. C. TEMPLE, B. S. C., F. R. G. S., M. R. A. S., &c. (With two maps and various sketches.)

• (Abstract.)

This is the last of a series of papers on subjects connected with the Afghans, written by the author and communicated to various Societies.\* After a few remarks on the geography of the route, which is illustrated by two maps, the author proceeds to review the well-known account of the Afghans of their own origin from a Jewish source, and next to describe in detail the history and peculiarities of the various tribes and clans of Afghans. This is followed by several chapters on the distribution of the Afghan tribes, their polity, their civilization, and their language† as illustrated by their place-names.

This paper will be published in the Journal, Part I.

3. *Coins Supplementary to Thomas' "Chronicles of the Pathan Kings."*—By CHAS. J. RODGERS, ESQ., *Principal, Normal College, Amritsar*. (With two Plates.)

(Abstract.)

The *Chronicles of the Pathan Kings* is a very full work, but naturally it is not exhaustive. Continued search brings out further coins which from time to time have to be described. In the present paper, the author describes about forty coins, which are believed to be as yet unpublished.

This paper will be published in the Journal, Part I.

4. *Specimens of Balochi Poems, transcribed in Roman characters, and translated, with Explanatory Notes.*—By M. LONGWORTH DAMES, ESQ., C. S.

(Abstract.)

These poems are widely spread in the Balochi country where they are recited by the bards, called *Doms* or *Loris*, to accompanying airs or chants. They are current in slightly differing versions. It is probable that they are of considerable age; for they contain many antiquated grammatical forms, and their versification is loose and formless. The paper gives three of these poems, entitled: "The Wanderings of the Rind Balochis," "The Quarrel of Mír Chákar and Gwaharám," and "Dostem and Shíren." The second is only one part of an extensive cycle of poems relating to Mír Chákar, who is the great legendary hero of the Rind Balochis and is represented by them

\* See Journal, A. S. B., for 1879.

† The best Grammar on the Pashtu Language is one by Dr. Ernest Trumpp; first published in the Journal of the German Oriental Society, Vol. XXI.

as having led them into the countries they now occupy from Makrán, and as having founded a kingdom with its capital at Seví (Síbí). The third relates the romantic story of Dostem, a young Balochi warrior, and his bride Shíren.

This paper will be published in the Journal, Part I.

5. *Remarks on a Pálí Inscription from Bhárhāt.*—By RÁJENDRALÁLA MITRA, LL. D., C. I. E.

Some time ago I translated for General Cunningham a Pálí Inscription in the Lát character found on the Eastern gateway of the Bhárhāt Stúpa. I had then before me a reduced eye-copy, and was doubtful about some of the letters. The last word of the record puzzled me most, and I suggested a reading different from what the letters before me would warrant. The gateway has since been removed to the Indian Museum, and I have had several opportunities of studying the record as inscribed on the stone. The result of this study I now desire to lay before the Society.

\* The record occurs on the left pillar of the gateway. The pillar is a compound one, made up of four shafts each having eight facets. The record is inscribed on two facets of the front and on three facets of the hind shaft. It is in a perfect state of preservation, and comprises four lines of matter arranged in five columns, the second and the third line extending to the fourth column and the fourth to the third. The words are :—

	1	2	3	4	5
Line 1	सुगणं Suganam	रजे raje	रज्ज rajna	गगीपुत्तस Gágíputasa	विसदेवस Visadevasa
	1	2	3	4	
„ 2	पौतेण pautēṇa	गोतीपुत्तस Gotiputasa	अगराजुस Agarájusa	पुत्तेण putēṇa	
	1	2	3	4	
„ 3	वाचीपुत्तेण Váchhíputēṇa	धनभुत्तिणा Dhanabhutiṇá	कारितं káritam	तोरणं toranam	
	1	2	3		
„ 4	सिलकम्मतो silákammato	च cha	उपण. upaṇṇa		

The first word of the first line is obviously the Pálí form of the Sanskrit *Srughna*, the name of a country; but the case-affix attached to it is incorrect. In Sanskrit and in Pálí the word is masculine, and in the nominative case in Pálí it should have no nasal mark after it. Assuming that in Pálí it was used in the neuter gender, still, the nasal mark for the neuter nominative should not be used, for the sentence has a different nominative. The word should be in the locative, *sugane* 'in Sugana.' If it be assumed

that it has been compounded with the second word *raje* which is in the locative, the dot for the case-mark would not be wanted. It is, therefore, obviously wrong, and is due either to the engraver having mistaken the mark of the locative *e*, or it is a blot. The second word, *raje* for *rájye*, being in the locative, cannot qualify the nominative. The meaning of the two words is: "in the kingdom of Sugana." The third word, *rajña* for *rájña*, is in the genitive, and qualifies the fifth word *Visadeva*, which is also in the genitive case. The fourth word is also an epithet qualifying Visadeva. It means "son of Gágí." The first word of the second line is in the instrumental case, and qualifies the causal nominative Dhanabhutíná of the 3rd line. It means "by the grandson." The second word is clear enough; it means "son of Goti," and is an epithet qualifying the third word *Aganijusa*, a proper name in the genitive, governing the last word *putena*, which is an epithet of the 2nd word of the third line. The first word of the 3rd line is also an epithet of the same kind. It means "by the son of Váchhi." The second word is the causal nominative of the sentence, and agrees with the causal participle which follows it, and which governs the objective case represented by the last word. The dots after the 3rd and the 4th words are very faint and appear to have been produced by abrasion of the stone, but they are wanted.

In so far the grammatical construction of the sentence and its meaning are perfectly clear; but the last line is very puzzling. Its first word is a compound of *Silá* "a stone" and *Kamma* "work," "fabrication," i. e., sculpture. The long vowel at the end of *Silá*, is so distinct that I cannot take the word for *Sila*, "good conduct." It is true that in the Laṭ Pálí writings the vowel-marks are frequently neglected; but the neglect is always shown by omission of vowel-marks, as in *raje* for *rájye*, and not by the insertion of marks where none is wanted; at least, I have nowhere seen an instance of the kind. The word *sila*, moreover, never takes the long vowel at the end, and, with it, it cannot mean good conduct, or moral merit. The meaning, therefore, must be 'stone carvings,' and this corresponds very well with the subject of the record. In the eye-copy I read the affix *at* the end of the compound *tá*. This is an affix commonly employed for the formation of abstract nouns, and is not wanted here, but it is often used as an expletive, as in *Devatá*, and does not disturb the sense,—at least I had no hesitation in accepting it as such. The second word *cha* is a conjunction, equivalent to the English *and*, and its effect is to bring forward the causal nominative Dhanabhuti, who not only caused the toraṇa to be erected, but also added to it sculptured decorations. It can also bring forward the causal verb *káritam*, but if a new verb be supplied it may be let alone. The most puzzling word in the record is *upanna*. When I first read it in the eye-copy I believed the dot over the *p* to be a mistake, and the word was

upāna, 'a plinth.' The dot, however, is perfectly clear and unmistakable, and cannot be rejected without assuming an error on the part of the engraver. If no such error be admitted, the word would be an incorrect form of the Sanskrit utpanna = Pāli uppanna, "produced." The inaccuracy I allude to results from the omission of one of the p's, but in the old Laṭ character double letters were frequently, if not invariably, simplified, and this I thought was an instance. I felt too that utpanna, as a neuter participle, could not agree with the causal nominative Dhanabhutiṇā. The writer of the record had correctly used the causal form in *kāritam* and could not be accused of having been ignorant of the causal form of *utpanna*, which is *utpādita*. It could not be made to correspond with the first word of the line *silākammata*, for that would be opposed both to grammar and sense. The use of the conjunction *cha* in prose brings forward the nominative Dhanabhuti, and this has to be rejected, and the conjunction declared to have been wrongly put. It had to be, moreover, assumed that the donor did not care to associate his name with the sculptures. In short, I had to accept either an error on the part of the engraver for having accidentally put a dot over a letter where none should exist, or ignorance of grammar on the part of the writer for not knowing the causal form of *utpanna*, and for putting a conjunction where none was wanted. I had no hesitation, therefore, in accepting the first branch of the alternative. An error on the part of an engraver was much more likely than ignorance of elementary rules of grammar on the part of a writer employed by an unquestionably rich man, probably a king. Moreover, a mistake of the kind was very liable to occur; the long vowel after p, in upāna is indicated by a very short dash on top, and it may be confounded for a dot.

• My revision of upāna, however, I now find, cannot be accepted, as the only fragment of the plinth of the tope seen by General Cunningham, is made of mortar and plaster, and not of sculptured stone, and the railing and the gateway have no plinths. The apparent reading upanna must therefore be accepted, deriving it from the Sanskrit *utpanna* "produced, born, arose;" or from *upapanna* "endowed or embellished," or from *upaghna* "that which is supported." The second appears to me to be the most appropriate, though the derivation is not quite satisfactory.

The correct reading of the first word of the last line I find is not *silākammata* but *silākammato* for the Sanskrit *silākarmatas*, used in an instrumental sense. Added to the last word it gives the meaning "embellished with stone carvings," a very appropriate epithet for the toraṇa; the *cha* being reckoned a mere expletive.

Putting the results of these remarks together I make out the following meaning of the inscription:—

"In the kingdom of Sugana, (this) toraṇa embellished with stone carv-

ings was caused to be erected by Dhanabhuti, son of Vāchhī and of Agarāju, the son of Gotī, and grandson of king Visadeva, son of Gāgī."

It will be seen that in this the donor assumes no regal title, nor does he assign any to his father. The word *rāju* is the second member of a compound word, and the two words together make up the personal name. The omission of all titles in the case of the donor may be due to a sense of humility, or to a desire to avoid the display of worldly greatness in a quasi religious monument, but this cannot be predicated of the father, who had probably then demised, as in the case of the grandfather the title has been carefully put in.

It is observable also that the grandfather traces his descent from his mother Gāgī, and does not name his father. To Indians of the present day nothing would appear more shocking than this. An adage is current among them to the effect that "a man who is known by his own name is the noblest, he who appeals to his father's name to make himself known, is of middling merit; but he, who has to appeal to his mother's name for the purpose, is vile, and he, who makes himself known by the name of his wife, is the vilest of the vile."\* The feeling is so strong in this respect that no gentleman will ever pronounce his mother's name, except when performing a religious rite, or in a legal document. In Bengal the usual plan to indicate a lady who happens to be the wife of the master of the house is to call her *ginni*, "the mistress of the house." Should she happen to have rivals, the fact is indicated by the use of the terms *Baḍa*, *Meja* &c., 'the eldest,' the 'second' and so on, but on no account is the name of any one recited. The same is the case with daughters-in-law, who are described as *Baḍabahu*, *Mejabahu*, and so on. Sometimes when greater precision is wanted the family name of the father of a lady is used thus, *Mitrer bādir jhī*, "daughter of the house of the Mitras." In the North-Western Provinces, both among Hindus and Muhamminadans, the same custom is followed, and the ladies are ordinarily indicated by periphrasis. This was, however, not the custom in former days; and not only the names of ladies of rank were freely used, but metronymics were formed extensively to indicate their children. To judge from the instances so abundant in the *Rāmāyaṇa* and the *Mahābhārata* the use of metronymics was ordinarily restricted to children born out of wedlock, or what would be the same thing, deserted by their fathers; but unforsaken legitimate children were sometimes so named. Long before the time of the *Rāmāyaṇa*, Pāṇini formulated a great number of rules for the formation of metronymics.

From the examples accessible to me it appears that generally the per-

\* स्त्रीनामा पुरुषोदयः पित्रनामा च मध्यमः ।

अथमः मातृनामा च पत्नीनामाधनाधनः ॥

sonal names of the mothers were used for the formation of metronymies, but the names of their race or country were not invariably rejected. Of the former class the instances at command are abundant. Thus Bhíshma, the great sage and general of the Kuru race, was called Gángeya, because he was born out of wedlock of the River Ganges in a personified form. Hanunán, the monkey general of Ráma, is called Anjaneya, because he was born of the storm-god Pavana by Anjaná, wife of Keśarí. Vyása, the compiler of the Vedas, is called Satyavatísuta, 'the son of Satyavatí,' a fisherwoman whom Parásara seduced. The Páṇḍava brothers Yudhisthira, Bhíma, and Arjuna, whose births are euphemistically attributed to Dharma, Indra, and Váyu, are frequently addressed by their metronymic Kaunteyá, the "sons of Kuntí." One name of Kuntí was Prithá, and Arjuna called himself Pártha in honour of her. Dhritaráshṭra born of Ambiká, wife of Vichitravírya by Vyása, is called Ambikásuta. Karṇa, another half-brother of the Páṇḍus, was born of Kuntí before her marriage, and, having been brought up by one Rádhá, bore the metronymic of Rádheya. In the Chhándogya Upanishád there is a remarkable instance of this kind. A boy, about to go to a tutor, asks his mother what was his family gotra, and she replies: "I know not, child, of what gotra you are. During my youth when I got thee, I was engaged to serve many as a maid-servant; I know not of what gotra you are; Jábála is my name, and Satyakáma thine; say therefore, when asked, that you are Satyakáma Jábála (son of Jábála)." The youth was accepted as a Bráhmaṇ for his boldness in telling the truth to his tutor, and subsequently he attained great distinction as an expounder of theology. The atheist Jábála, who figures so prominently in the Rámáyana, was a descendant of this youth. Of deserted sons taking the metronymic we have an instance in the Aitareya Bráhmaṇa. The first mother of the Aitareyins was Itará. Her husband deserted her and her infant son, and therefore the latter took the name of his mother, and called himself Aitareya. Lakshmaṇa, forsaken by his father, bore the metronymic of Saumitra, son of Sumitrá.

Of race names the only instance I can call to mind just now is Gautamí, the foster-mother and aunt of Buddha. Of names of females formed by those of their native countries we have Mádrí, named after the country Madra where she was born, and her sons born out of wedlock are called Mádreya: Gándhárí, wife of Dhritaráshṭra, owes her name to her father's country Gándhára, modern Kandhár; Buladeva, transferred from the womb of Devakí to that of Rohiní to save him from being destroyed by the Indian Herod Kaṣís, bears the name of Rauhiṇeya. Other instances of this kind may be multiplied *ad libitum*; but I suppose they are not wanted. Those I have cited will suffice to show that metronymies were formerly largely used, and that in most instances they implied some flaw in the birth,

or some difference with the male parent. Nor was the circumstance of one's being born out of wedlock, however unpleasant it may be to be told so, held a bar to distinction in learning or social rank in ancient times. Not to advert to modern Dukes, Marquisses, Lords, Baronets, Rájás, Navábs, and others, the bar sinister on whose escutcheons has not in the least interfered with their rising in social rank in our times, the renown of Vyása, Jábála and the Páṇḍus suffices to show that none need doubt the fact of metronymics having been derived from the personal names of mothers, and of Indian people having used them without scruple.

The three female names given in the inscription, Gágí, Gotí and Váchhí, in their Sanskrit forms would be Gárgeyi or Gárgyi, Gautamí, and Vátsí, and these are largely used in race or Gotra names; but there is no reason to suppose that they have been used in the inscription to indicate gotras. According to Hindu law no male person can inherit the gotra of his mother, or wife. On the contrary every woman ceases to be of the gotra of her father the moment she is married, and the marriage rite includes a ritual for effecting this change. No Hindu, therefore, can be expected to appeal to the gotra of his mother's father. Personal names may be formed of gotra names; but when so formed they are strictly proper names, indicating particular individuals, and not races or tribes. Moreover, a patronymic or a metronymic formed by an affix may indicate an immediate descendant, or one, two or more generations removed; and when great precision is sought, it is usual to avoid affixes, and to compound the name with the word putra, "son," whereby the name becomes at once specific, and the nearest relationship is implied. In the inscription this specific form, Gágíputra, is used, and therefore no legitimate doubt can be entertained of the names having been intended for particular individuals.

6. *A List of the Earthquakes recorded in Assam during the year 1879. Communicated by the Meteorological Reporter to the Government of Bengal.*

This will be published in the Journal Part II.

The following communication has been received.

*Note on some copper Buddhist Coins.—By H. RIVETT-CARNAC, C. S.*

C. I. E.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in February last.

## TRANSACTIONS, PROCEEDINGS AND JOURNALS,

*presented by the respective Societies and Editors.*

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- Bombay. The Indian Antiquary,—Vol. IX, Part 103, February 1880.
- Bordeaux. La Société de Géographie Commerciale,—Bulletin, Nos. 2 and 3, 1880.
- Calcutta. The Mahābhārata,—No. 43.
- Cambridge (U. S.). Museum of Comparative Zoology at Harvard College,—Annual Report for 1878-79.
- Dresden. Die Verein für Erdkunde,—XVI Jahresbericht.
- London. The Academy,—Nos. 402, 404—406.
- . Royal Astronomical Society,—Monthly Notices, Vol. XL, No. 2, December 1879.
- . The Athenæum,—Nos. 2726—2729.
- . Royal Geographical Society,—Proceedings, Vol. II, No. 1, January 1880.
- . Institute of Mechanical Engineers,—Proceedings, No. 5, October 1879.
- . Royal Microscopical Society,—Index to Vol. II of the Journal.
- . Nature,—Nos. 245, 249, 250, 256, 444, 453, 461, 463, 467, 518, 522, 534, 535, 537, and Extra Number published on the 6th of February, 1880.
- . Royal Society,—Proceedings, Vol. XXIX, No. 198.
- Hennessey, J. B. N.*—Further particulars of the Transit of Venus across the Sun, December 9, 1874; observed on the Himalaya Mountains, Mussoorie, at Mary-Villa Station, Lat. 30° 28' N., Long. 78° 3' E., height above the sea 6,765 feet, with the Royal Society's 5-inch Equatorial. Note III. *Stewart, Jalfour* and *Dodgson, W.*—Preliminary Report to the Committee on Solar Physics on the evidence in favour of the Existence of certain Short Periods common to Solar and Terrestrial Phenomena. *Hannay, J. B.* and *Hogarth, J.*—On the Solubility of Solids in Gases. *Galton, F.*—The Geometric Mean in Vital and Social Statistics. *McAlister, D.*—The Law of the Geometric Mean.
- . Society of Telegraph Engineers,—Journal, Vol. VIII, No. 28.
- Mance, H. C.*—Remarkable Phosphorescence in the Persian Gulf. *Ayrton,*

W. E.—Note on Mr. Mance's letter on "Remarkable Phosphorescence in the Persian Gulf."

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Paris. Journal Asiatique,—Vol. XIV, No. 3.

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Schindler, Dr. E.—Die Larve des *Seymouria analis* Fb. ein Wachsthumproducent.

Turin. Reale Accademia delle Scienze,—Memorie, Vol. XXXI.

Vienna. Anthropologische Gesellschaft,—Mittheilungen, Vol. IX, Nos. 7—8.

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Nehring, Dr. A.—Fossilreste Kleiner Säugethiere aus dem Diluvium von Nussdorf bei Wien.

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*presented by the Authors, Editors and Translators.*

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BOEHTLINGK, O. Sanskrit Wörterbuch. Part I. Die Vocale. 4to., St. Petersburg, 1879.

FOUCAUX, PH. ED. Vikramorvaçī ; ourvaçī donnée pour prix de l'héroïsme : drame en cinq actes de Kalidasa. Traduit du Sanscrit. 12mo., Paris, 1879.

HODGSON, B. H. Essays on the Languages, Literature and Religion of Nepâl and Tibet. 8vo., London, 1874.

WOOD-MASON, J. Morphological notes bearing on the Origin of Insects. 8vo., London, 1879. Pamphlet.

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BEAMES, J. A Comparative Grammar of the Modern Aryan Languages of India. Vol. III. The Verb. 8vo., London, 1879.

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Annual Report of the Geological Survey of India, and of the Geological Museum, Calcutta, for the year 1879. *King, W.*—Additional Notes on the Geology of the Upper Godavari basin in the neighbourhood of Sironcha. *Lydekker, R.*—Geology of Ladak and neighbouring districts. Teeth of Fossil Fishes from Ramri Island and the Punjab. *Feistmantel, Dr. O.*—Note on the Fossil Genera *Niggerathia*, Stbg., *Neggerathiopsis*, Fstm., and *Rhiptozamites*, Schmalh. in palaeozoic and secondary rocks of Europe, Asia, and Australia. Notes on Fossil Plants from Kattywar, Shekh Budin and Sirgulah. *Clark, G. T.*—On Volcanic foci of eruption in the Konkan.

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THE SECRETARY OF STATE FOR INDIA.

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D. D.—On Certain Effects of Starvation on Vegetable and Animal Tissues.

Bloomfield, J. E.—On the Development of the Spermatozoa. Part I, *Lumbri-*

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Report on Sanitary Measures in India in 1877-78, together with miscellaneous information up to June, 1879. Fep., London, 1879.

# PROCEEDINGS .

## OF THE

# ASIATIC SOCIETY OF BENGAL,

### FOR APRIL, 1880.

The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 7th April, at 9. 15 p. m.

H. B. MEDLICOTT, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Surveyor General of India,—Account of the operations of the Great Trigonometrical Survey of India. Vol. V. Details of the Pendulum observations and of their Reduction. By Captain J. P. Basevi, and Captain H. J. Heaviside.

2. From Dr. R. Mitra,—Facsimiles of Inscriptions from the Great Temple of Puri.

3. From Dr. G. Leitner,—Proceedings of the Anjuman-i-Panjab in connexion with the proposed Bill for the appointment of persons to the office of Kazi.

4. From the Home, Revenue and Agricultural Department,—(1) Yajurveda Sanhita. (2) Scientific Results of the Second Yarkand Mission: Rhynchota. By W. L. Distant.

5. From the Superintendent, Marine Survey Department,—Charts of (1) Jaygad and Entrance to Shāstri River, (2) Chaul and Entrance to Kundalika River, (3) Quilon Roads, and (4) Mullaitivu.

6. From the authors,—(1) Erläuternde Angaben über den IV Band der "Reisen in Indien und Hochasien" nebst Bericht über die landschaftlichen Aufnahmen und die Tafeln. By H. von Schlagintweit-Sakünlünski. (2) Account of the Incarnation of Govardhananatha. By Mohun Lall Vishnu Lall. (3) The Toungoo God-language conspiracy. By Mrs. Eleanor Mason.

The following gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

W. Fiddian, Esq.

• N. Elias, Esq.

Babu Bipin Chunder Rai.

Ananda Rāma Gajapati, the Raja of Vizianagram.

The following are candidates for ballot at the next meeting—

1. R. H. McLeod, Esq., C. S., Assistant Magistrate, Benares, proposed by H. Rivett-Carnac, Esq., seconded by P. C. Wheeler, Esq., C. S.

2. Rao Sahib Visvanath Narayana Mandalik, C. S. I., Bombay, proposed by Dr. R. Mitra, seconded by J. Crawford, Esq.

3. Babu Tara Prasad Chatterjea, proposed by Moulvie Abdul Latif Khan, Bahadoor, seconded by J. Crawford, Esq.

The SECRETARY reported that the Hon. C. D. Field, and Dr. V. Richards had intimated their desire to withdraw from the Society.

The SECRETARY submitted the following Estimate of Income and Expenditure for the year 1880.

#### INCOME.

Balance in hand.....	Rs.	3,617	5	4
Subscriptions.....		7,000	0	0
Sale of Publications.....		1,600	0	0
Interest on Vested Funds.....		6,131	0	0
		<hr/>		
		18,348	5	4
		<hr/>		

#### EXPENDITURE.

Publications.....	Rs.	7,000	0	0
Library.....		3,000	0	0
Book-Cases for Library.....		1,000	0	0
Establishment.....		4,200	0	0
Contingencies.....		1,200	0	0
Building and Furniture ...		600	0	0
Coins.....		200	0	0
Taxes.....		852	0	0
		<hr/>		
		18,052	0	0
		<hr/>		

The SECRETARY exhibited a metal celt forwarded for the inspection of the Society by Mr. H. Rivett-Carnac, and read a Memorandum by him on the same.

Mr. Rivett-Carnac says:

I submit herewith for the inspection of the Society what appears to be a metal Celt of the type well known in many collections in Europe.

The implement which was in all probability used as an axe-head or hatchet, is  $5\frac{1}{2}$  inches long by 4 inches broad. The metal is apparently bronze, being too hard and heavy for copper.

It was found in the Hurdul District, Oudh, by Colonel Montague Procter who has been good enough to place it at my disposal.

A reference to the sketch which accompanies my paper on Prehistoric Remains in the Central Provinces will shew a similar implement of iron, with the bands by which the ~~axe~~ head was fastened to the shaft.

Dr. HOERNLE exhibited a number of Buddhist copper coins, and read a note on the same by H. Rivett-Carnac, Esq., C. S., C. I. E., F. S. A. They form a collection of 22 small coins, all belonging to Mr. Rivett-Carnac, and kindly sent by him for the inspection of the Society. Most of the coins are round; but a few are square. The obverse generally shows some animal (bull, elephant, or lion); the name of the king being inscribed above or below the figure. The reverse generally shows some Buddhist symbols. The names are not very distinct; but such as they are, they have been read by Mr. A. Carlleyle, as follow: *Vaisākha Deva* (2 square coins), *Kamuda Sena*, *Aja Varmma* or *Asha Varmma*, *Maphaba Varma*, *Maha Satama*, *Satya Mitra*, *Ayu Mitra*, *Suya Mitra*, *Jaya Mitra*, *Vijaya Mitra*, *Laranga* or *Larāta* or *Lājasa*, *Sūgāta Janapya*.

Mr. Rivett-Carnac's note with a Plate of the coins will be published in Part I of the Journal.

Dr. HOERNLE also exhibited 28 small copper coins of the Sunga Dynasty, and read a Memorandum on them by H. Rivett-Carnac, Esq., C. S., C. I. E., F. S. A. These coins also belong to Mr. Rivett-Carnac, they are mostly of the same type as those which were noticed in the Proceedings for January. The memorandum is principally occupied with a description of the monograms or devices of the different kings, exhibited on the reverses of the coins. On most coins the device is a standing figure on a platform, between two staffs surmounted by three cross-bars; the head surrounded by rays or flames. On others, however, the platform and the side-poles are wanting; on others again the figure is female.

Dr. Hoernle remarked that great credit was due to Mr. Rivett-Carnac for his success in collecting so many new or as yet little known coins. As to the device on the reverse of some of the Buddhist coins, which Mr. Rivett-Carnac supposed to represent the *triśūla*, it really was the Buddhist symbol *triratna* or "three jewels," on the two sides of which there seemed to be represented bodhi-trees. On two coins he could distinguish the figure of an elephant; on two others there was the cross-like symbol,

*svastika*. What Mr. Rivett-Carnac had supposed to be a pair of fishes, might possibly be a conventional mode of figuring the sacred *Buddhapada* or foot-prints of Buddha.

Mr. Rivett-Carnac's Memorandum will be published in Part I of the Journal.

The following papers were read—

1. *Note on an Inscription on an ancient Mosque in Koh Inám, Zillah Allahabad, sent by A. M. MARKHAM, Esq., C. S.—By MAJOR H. S. JARRETT.*

An inscription on ruined Mosque in Koh In'am, Pergunnah Kara, Zillah Allahábád, (a large village razed to the ground for rebellion in 1858,) sent by A. M. Markham, Esq., C. S., was shown by Dr. Hoernle who read the following note of Major H. S. Jarrett on it :

The inscription is as follows :

نباشد مسجد جامع منور	بعد شاه عادل هفت کشور
شه فیروز شاهشاه غازی	بفرمانش بناء خیر قاضی
حسام الدین حسن صدر نه عانه	که فضلش گشت در عالم نشانه
بسایه ماه رمضان گشت موجود	ز شجرت هفتصد و هشتاد و شش بود

۷۸۶

(This) Glorious Jāmi Masjid was built

In the reign of the just king of the Seven Regions of the World.

King Firúz king of kings the Champion ;

By his command, the auspicious foundation of the Kāzi.

Husāmu'ddīn Hasan, chief of the age\*

Whose eminence is a beacon in the world,

Was completed on the last day of Ramadán†

It was in the year 786 of the Hijrah.

This was in the reign of Firúz Shah of the House of Tuglak.

I find a mention in the *Tarikh i Firúz Shāhi* (of Zia'uddin Bami) of a *Husāmu'ddīn Hasan* who was Finance Minister or Examiner of Accounts in the reign of Ghiasuddin Tughlak Shāh who assumed the crown in 721 A. H. (1321 A. D.) The Chief Kādhi during his reign and that of his son Muḥammad was Kamālu'ddin.

The Chief Kazi (Sadr Jahán or Sadr Zemána) in that of Firúz Shah, was Jalálu'ddin Kirmíni. There is no mention of a Husāmu'ddin in his

\* A title given to the Kádhiu'l Kuzzát or Chief Kāzi.

† Monday, 15th November 1384.

reign—yet the inscription describes this person as a Kázi and the title Sadr Zemána confirms it. Probably one of the name succeeded Jalalu'ddín on that Kazi's death but there is no trace of this to be found in the works I have consulted.

2. *The use of Silver Films in Improved Instruments of the Camera Lucida class.*—By J. C. DOUGLAS, Esq.

These instruments are divisible into two classes, *viz.*, that in which a reflected image of the object is seen while the tracing point is seen direct, and the other class in which the object or tracing point is seen by reflection, but the tracing point or object is seen by light transmitted through a plate which acts at the same time as a reflector. The forms in most common use are the camera lucida, and the steel disc or Soemmering's mirror of the first class; and the parallel plate or tinted glass reflector of the second class. There are other forms less common but each referable to one of the two classes described above. Instruments of the first class give a brilliant and well defined reflected image; but they are fatiguing to use, and some persons experience great difficulty in using them. Instruments on the other principle are far more easily used, they cause less fatigue, but the reflected image is not so brilliant. In the case of the plane glass reflector the definition cannot be so good, as both surfaces of the glass reflect and there are therefore two superimposed images which do not exactly coincide; the second reflection is, however, weakened by using tinted glass, and this colouring also serves to reduce the transmitted light which would otherwise flood out the weak reflected image.

What is required in an instrument of this kind is the brilliancy and clear definition of the camera lucida, combined with the simplicity and ease in use, and the cheapness, of the tinted plane glass reflector; with the facility when desired, for using two reflections in order that the reflected image may not be reversed. I believe these requirements are attainable by the use of silver films on glass.

Silver films are so highly reflective that two or more successive reflections may be used if desired; by transmitted light the colour of the film is suitable for tinting the glass. The thickness of the film may be regulated according to requirements, a thick film being used when reflection only is required, and a thinner one according to the ratio desired between the reflected and transmitted light. The reflective power of the thinnest film is greatly superior to that of glass. The silver film is applicable to most forms in use, and it may be used not only on plane but on curved surfaces, *e. g.*, a plano concave lens silvered on the plane side might be used by a short-sighted person instead of the common plane reflector used in sketching microscopic objects, a slight curvature of the 1st or 2nd reflecting sur-

face in the camera lucida might be used to render it unnecessary to employ a lens to equalize the sensibly different distances of the images of the object and plane of delineation. The cost of silver films on glass is very trifling, and if taken care of they last for years; a number might be made at intervals, or they might be supplied for a trifling sum by the opticians.

For many purposes the films might be deposited on thin glass and varnished or protected by glass, when they would be very durable and would bear handling. For some purposes the film might be thickened by electro deposition and removed from the glass. As the films are so cheap, a number of graduated thickness might be kept, and a suitable one selected in each case to adjust the relative brilliancies of the reflected and transmitted light; or the films might be applied as the dark glasses usually supplied with the camera lucida, but this seems less simple and convenient than the use of a thicker or thinner film as transmitting reflector. A silver surface may reflect upwards of 90% of the incident light, a total reflecting prism has been found to reflect only about 75% or less, the loss being due to reflection at the first surface and absorption; the superiority of the silver surface is evident, particularly when several successive reflections are required. Even if the highest attainable brilliancy be not generally required, still the higher this is, the greater the range of adjustment without alteration of the source of light. The strictest regularity in the film not being essential, suitable films are very readily obtained. With strict cleanliness, pure chemicals, care that the glass is wetted equally in every part by water or alcohol at the moment of immersion in the silvering solution, and care that the solution is properly mixed, *i. e.*, homogeneous, success is readily attained.

I find\* that 'Professor Govi of Rome has devised' a form of camera lucida in which a metallic film is used. He simply gilds the reflecting surface of the camera lucida prism with a thin film of gold, and cements to this surface with canada balsam another similar prism; M. Nachet has adopted this improvement in the construction of various forms of camera lucida. The greater advantage of the silver film are obvious. By the use of silvered glass, instruments of various forms and of large size may be readily constructed for a trifling sum by any ingenious person; thus an instrument may be devised and readily constructed for any special purpose. The following is a description of the instruments exhibited at the meeting:

1. An ordinary tinted glass reflector for use with the microscope. The tinted glass usually used was replaced by a piece of glass covered with a thin film of silver. The silvered side is turned towards the eye-piece and

\* Annual Record of Science and Industry, 1875, p. 144.

reflects the magnified image. In this form several reflectors differing in the thickness of the silver film should be available for regulating the ratio between the transmitted and reflected light, but a certain thickness of film will be found which is applicable to most purposes so that change of reflector is seldom necessary.

2. Camera lucida with double reflection, Plate I, figure 1. The first reflection is from a thick film of silver, the second is from a thinner film. The thickness of the second film may be adjusted as described above. It will be seen that the plane of delineation is seen *through* the second reflector, not past it as in the ordinary instrument. In the diagrams the thick oblique lines are the silver films, the thin lines the directions of the light, the arrows the objects and the dotted line, the paper on which the objects are to be drawn.

3. A form of reflecting camera for sketching microscopic objects, Plate I, figure 2. This instrument being fitted to the eye-piece of the microscope, the paper and pencil point under the larger reflector appear in the field of the microscope. The object is seen direct. The second mirror in the instrument exhibited was an inch square. This instrument may be used with the body of the microscope at any angle, it being merely necessary to place the drawing paper in a plane parallel with that of the microscope stage. In the figures 2 and 3 the mirrors are represented as parallel, they should usually be slightly inclined to each other to increase distance between plane of delineation and the object.

4. Another reflecting camera for sketching small objects is represented in Plate I, figure 3. In the instrument exhibited the larger reflector was  $1\frac{1}{2}'' \times 1\frac{1}{4}''$  and placed 10" from the paper, the field was about  $4\frac{1}{2}$  inches square. This instrument may be used horizontal or inclined, and it is admirably adapted for drawing such objects as insects, leaves, shells, &c. If the vertical distances between the mirrors and the object and paper respectively be constant in instruments of this form, the relative magnitudes of object and drawing will obviously vary with the distance between the reflectors. It is evident that by the use of reflectors in instruments of this class, the reflecting surfaces may be larger and the distance between them greater than if a prism were used.

The above are only examples of the application of silver films to a particular class of instrument, it is evident they offer great facility for giving this class of instrument its maximum development. It is obvious also that silver films are applicable with advantage in many other cases where prisms are used at present, particularly where it is desired to divide a beam of light into two; *e. g.*, if figure 3 be turned upside down, and the two eyes of the observer be in the place of the arrow and the dotted line, the diagram represents an arrangement suitable for a

non-stereoscopic binocular microscope, the inclination between the mirrors being varied to suit the distance between the eyes; the loss of light in such an arrangement would be very little, and the brilliancy of the two images might be rendered very nearly equal.

To illustrate how cheaply such instruments may be made the mirrors in the instruments exhibited were mounted in tubes of thin sheet zinc which is readily cut with ordinary scissors and bent into shape with pliers; a coat of asphalt varnish used for making shallow cells was applied for the sake of appearance. The instrument, figure 2, was fastened to the eye-piece by a piece of zinc bent half round the eye-piece tube and held against it by a small elastic rubber band. The tinted reflector was supported by a bent plate of zinc hung on the milled edge of the eye-piece by a groove passing almost half round the eye-piece; this is a most convenient method of attaching the reflector or camera to the eye-piece, as it is quite firm enough and yet removable in an instant without disturbing the microscope.

### 3. *Transcripts and Translations of two Inscriptions from Buddha-Gayá.*—

By DR. RÁJENDRALÁLA MITRA, C. I. E.

Dr Mitra stated that during his last stay at Buddha-Gayá he tried much to obtain copies of all the inscriptions that could be had there, but, owing to various causes, a few escaped him. Two of these had been lately placed at his disposal by General Cunningham. They were not of any very early age, nor connected with the history of the great temple at the place; but both of them were dated, and of interest. The larger of the two records measures 19 × 12 inches, and comprises 17 lines of writing, parts of which have been obliterated. The small one is limited to 7 × 6 inches, and contains 8 lines of Sanskrit. The character used is in both the same, the Kuṭila, but of different periods.

The language of the large record is high-flown, and very much involved. Metaphors and similes are scattered in it with no niggard hand, and they are mostly very much over-strained, and difficult of reproduction in plain English.

The purport of the monument is the commemoration of the excavation of a cave (Guhá), the dedication of the images of the "three jewels" of Buddhism, and the performance of a sacrifice in a courtyard. The epithets used to describe the three jewels are, as far as the words are concerned, easy enough, but it is difficult to make out their bearings. The word used for the sacrifice is *Satra*, which is a Vedic rite, which no Buddhist would celebrate. Probably the word has been used in a restricted sense to imply some Buddhist ceremonial the nature of which is not known. The courtyard is not properly defined; it may mean the area before the cave, or that in front of the Great Temple before the Bodhi tree—probably the former.

The author of the pious deeds was a hermit of the name Jayachandra, who was the spiritual guide of the king of Káśi, and a disciple of a saint named Śrimitra, whose eulogy fills more than one half of the record. All the pious deeds were performed on the same day, *i. e.*, on Saturday, the 5th of the wane, in the month of Jyaiṣṭha, in the year of Vikramánka 124? The date is given in words of which the fourth has been obliterated. The first three are clear enough, and the fourth must have been a word of two syllables implying a figure from 1 to 9. This carries the record to the last decade of the 12th century. A Káyastha, of the name of Manoratha, composed the record; one Purarada transcribed it, and Dhárádhara engraved it.

The second record was inscribed on the 18th year of the reign of Dharmapála, who was the 2nd of the Pála dynasty of Bengal. According to Dr. Mitra's calculation he must have begun his reign on or about 875, and the record must, therefore, belong to the last decade of the 9th century. It commemorates the consecration of a four-faced Mahádeva, and the excavation of a tank by one Śaka, son of a sculptor, at a cost of three thousand Drummas.

The two records are separated by an interval of about three centuries, and the earlier of them shows that Hinduism was flourishing at the time at Buddha Gayá, and the later one proves that Buddhism had not lost all influence there at the close of the 12th century, and that the excavation of Buddhist caves had not ceased, as supposed by some, between 650 and 675 A. D., the uncertainty, instead of ranging within the narrow range of 25 years, extending to over five centuries. It, likewise, shows that in that century the current coin of the place was called drumma, the Sanskrit form of the Greek Drachma. Mention of this money has been met with in other records. The drumma appears to be a sequel to the currency of the dinar mentioned in an inscription on the Sanchi gateway.

*Transcript in Devanágari of Inscription No. 1. •*

- १। ॐ नमो बुधायः । उद्धृतः स्मेरभाविः प्रविकचरचिरश्रीविशालदिआलीबालेदूङ्गश्च-  
दुश्चतुर्विततिपदेनोदयन्निः समन्तात् । अन्तस्सुदृढशुद्धप्रव-
- २। रमुदगुष्पानधामप्ररोहेः संवदो भूतिहेतुस्त्रिजगदगदयन्नस्रशालः त्रिवे वः ॥ ( १ )  
यस्यान्तःस्फुरदुज्ज्वलोज्ज्वलजगदुबोधप्रचन्द्रोदयज्योतिर्जाल-
- ३। विजृम्भितैरिव शरच्चन्द्रप्रभस्य प्रभोः । भाति प्रस्तुतपाटलांमल्लनखनेष्विष्विच्छन्ना •  
राजः कोपि लपात्तको दिशतु वः श्रेयस्सलोकेश-
- ४। रः ॥ ( २ ) अथास्मिन्मत्सर्वेष्वस्त्रविषयव्याघ्रहर्त्रैर्भीमयन्त्रार्णोत्कर्षविशेषकक्षितमिति-  
ष्योतिःपताकामिव । विश्वव्यापिल्लपाक्षपाणमभितः
- ५। श्रीनिर्मितं विधतोदेयादेकजटापटूक्षतजगदुयुष्मन्मभुञ्जतिम् ॥ ( ३ ) अस्मि विद्यो-  
कीषु क्षतप्रक्षतः सञ्चानामानन्तितसम्भूतः । सम्मन्त्रसिद्धान्तयधी-

- ६। रभूतः श्रीमिचनाना परमोवधूतः ॥ (४) ह्रिंस्त्रिंशमशेषाः क्रुधमधिकवृत्तसू-  
वलासमाश्रु व्याधूयो + म्वचन्ताः प्रणयपरतया विश्वविद्यासमू-  
७। मेः। चेतःसंप्रीयमाणा मधुरतरदृशोः श्लेषपेयूषपातैस्तिर्य्यङ्गः सू (सु) कवन्ति च्युतमल-  
पटलं यस्य मैत्रीषु विचम ॥ (५) सिद्धोरष्टविष्टकष्टपटलावदृश-  
८। मभ्युद्गताः स्तेनोपेत्य पतिं रता गुणगणव्यासङ्गिनी रङ्गिनीः। यथाद्वैतमना मनागिव  
दृशः प्रान्तेन पादान्मगा जीवन्मुक्तिवधूविला-  
९। सूरसिकः सावर्ज्यमालोकते ॥ (६) वीतसृष्टोऽपि क्षपया जगदुद्दिधीर्षुः सम्बुद्धत्यपरमः  
परमोच्चदृष्ट्या। प्रत्यपीपतीनपरनिष्ठमतीन् विनीय यः श्रीष-  
१०। नार्चनचरणानचिरेण चक्रे ॥ (७) सृष्टं न यदुयाचकचेतसापि नित्यन्दप्याश्रु  
दिश्यतस्रम्। चिन्तामणिचिन्तितज्ञानचन्द्रे यस्मिन्नावप चपयेव च द्या-  
११। म् ॥ (८) स्थायं स्थायमशेषनिर्जरसरित्स्नोतःखयज्जगन्मनः सम्यग्ब्रह्मपदस्यशेषोपि  
वदृशः श्रीष्टदिभाजीश्वरम्। शेषेणापि तुलामपेत्य कृतिनः प्रथ-  
१२। ज्ञमद्युतनोः कीर्तिरद्भुतमुद्भवत् त्रिभुवने धावत्यमाकल्पशः ॥ (९) उदितमकलभूमीम-  
ण्डलेश्वर्यसिद्धिः स्वयमपि किमपीच्छन्च्छधीयस्य शिष्यः। अभ-  
१३। वदभवभाजः अद्यया बन्धुरात्मा दृपशतकृतमेवः श्रीजयचन्द्रदेवः ॥ (१०) श्रीमन्म-  
न्त्राधिपदस्य शास्त्रपामादिकं मग्नमशेषमेव। काशीश्रीदीक्षागुरु-  
१४। वदधार यः शासनं शासनकर्णधारः ॥ (११) सम्रजसान्यपाथोदकान्नकौस्तुभवासं।  
बन्धुमानां दिवा सूर्जि दत्तताराकुतोत्तराम् ॥ (१२) उग्रताराधरान्नत्र सिंव-  
१५। + + पुरस्सरीम्। श्रीमज्जयपुरे बोधीमत्र चैतां कृती गुहाम् ॥ (१३) सचाणि  
तिष्ठन्तां चासामङ्गनेषु निरङ्गणः। सोयं श्रीमज्जगन्निनः शास्त्रतीक्ष्णतृण + + ॥ (१४)  
१६। + + वेदनयनेन्दुनिष्ठया\*\*संख्यायाङ्कपरिपाटिलक्षिते। विक्रमाङ्कनरनाथवत्सरे  
ज्यैष्ठमासि युगपद्गदीधयत् ॥ (१५) कायस्थवंशहंसश्रीसीदसुतो मनोरथः  
१७। + +। अकृत प्रशस्तिमेतां गुणिगणचरणाम्बुजधरम् ॥ (१६) अलिखत्तिखता-  
मर्थाः श्रीमानेतां पुरन्दरः। टङ्कैवदकिरद्दीरः शिल्पी चाराधराभिधः ॥ (१७)

*Translation of the above.*

Om! salutation to Buddha.

1. May he, who is of smiling nature, who is of delightfully expanded beauty, who is endowed with the radiance of the sprouts of his internal, thriving, noble and mighty mass of merits, made manifest by the light of the young moons of the large rows of his teeth, who, for the sake of glory, has relieved the three spheres of all illness by bestowing on them the S'āstra—may he be to your welfare.

2. May that lord of regions, the lord, the autumnal moon-light of whose heart is manifest by the resplendence of the glorious light of the world-enlightening moon of knowledgo, whose benevolent mind appears

lustrous under the guise of the resplendent row of his pure, rose-coloured nails—may he grant you blessings.

3. May he, of the one lock of matted hair, whose mind is engaged in friendship for those who depend on him, who holds up, like a standard, the white light of noble speech, who wields the beautiful scymitar of all-pervading mercy which has made the world fearless—may he promote your prosperity.

4. Here lived a noble hermit of the name of Śrimitra, the chief of the pure race of Sambuddha, renowned in the three worlds, who had imparted to all beings the secret knowledge (lit. the Mantra) of the noblest sacrifice,

5. by whose friendly aid the ferocious, giving up their needless ferocity, the passionate forsaking their superabundant anger, the timid abandoning their fear.——Relying on the friendship of him who is the asylum of radiance in this world, even (wild) animals, endowing themselves with love, conversed with each other with affection, diffusing the nectar of their delightful eyes. What a wonder!

6. Enamoured by the maiden of emancipation in this life, that person of undeviating mind, did not by the corner of his eyes, cast even a reproachful glance at the eight Siddhis, who had achieved the exclusion of all created evils, who were devoted voluntarily to their husband, who, delighted in the enjoyment of good qualities, and who lying at his feet.——

7. Although devoid of all desires, he, thoroughly versed in all the works of Buddha, and, always looking up for high enterprise, through his benevolence, was anxious for the salvation of the creation. He, by his teachings, made heterodox kings to betake to the worship of Śrighana, (Buddha).

8. He always bestowed freely even what did not cross the mind of beggars; beholding which (the jewel) Chintāmaṇi, the greatest giver of gifts, through shame hid itself in heaven.

9. The work of him who, bathing over and over in the river of endless felicity, had, from the day of his birth, taken the lord proprietor of wealth and propriety for asylum, who,——having repeatedly touched the dignity of the highest Brahma, had ultimately become unrivalled among wise men, and of thriving person;——his works had attained a wonderful whiteness for ages.

10. Śrī Jayachandra Deva, the adored of a hundred kings, the benevolent from devotion, the perfection of whose glory had spread all over this earthly globe, wishing something, became a disciple of one whose knowledge was transparent, and who had renounced the earth.

11. He, becoming the spiritual guide of the king of Kási, and the instructor of law, revived the lost ordinances and the endless scriptures of the Mahábodhi.

12. The three Bodhis——adorned in golden raiment, resplendent as the garlanded cloud of twilight——the adored of day with the forehead decked with a bright star.

13. Bearing a refulgent star——this cave, in the auspicious Jayapura,

14, 15. as also three sacrifices (satras) in the courtyard, the wifeless, and of noble deeds. With reference to the three,—the friend of the world with firm faith at once accomplished in the fortunate year comprising the numbers—the Vedas, (4) the eyes, (2) the moon, (1) (and)——(?) of the era of the Lord of men, Vikramánka, in the month of Jyaishtṥa.

16. Manoratha, son of S'risída, of the noblest of the Káyastha race, a bee on the lotus feet of the learned, composed this eulogium.

17. Purandara, the adored of scribes, transcribed this, and the clever artist, named Dhárádharma, engraved it with his chisel.

*Transcript in Devanágari of Inscription No. 2.*

१ । तदस्य (१) + शायनभरस्य उज्ज्वलस्य शिलाभिदः ॥ +

२ । शकाख्येन पुत्रेण महादेवस्तुम्भः ॥ शेट +

३ । स + + स + + महाबोधिनिवासिनी ॥ स्नानक +

४ । + अक्षयानु श्रेयसे प्रतिष्ठापितः पुष्करि-

५ । ण्यत्य(च) + या च पूता विष्णुपदीवसा ॥ चितये-

६ । न सचक्षेण द्रव्याणां खानिता + ता ॥

७ । षड्विंशतितमे वर्षे धर्मपाले महीभुजि

८ । भाद्रवकुलपद्म्यां खनोर्भास्त्र-

९ । रस्याहनि ॥

*Translation.*

For endless virtue and for the good of the inhabitants of Mahábodhi, an image of the four-mouthed Mahádeva was consecrated by S'aka, the son of the noble sculptor, —sáyanabhara. (?) A tank, holy as the river, born of the feet of Vishṇu, was also excavated by him at a cost of three thousand Drummas, on the 26th year of the great king Dharmapála, on the 5th of the wane, on the day of the son of the lord of light, (Saturday).

*4. Description of a new Lepidopterous Insect belonging to the genus Apatura.—By L. de NICEVILLE, Esq.*

This paper will appear in Part II of the Journal.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in March last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
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*presented by the Authors.*

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*Whitfield, R. P.*—New Forms of Fossil Crustaceans from the Upper Devonian

Rocks of Ohio. *Marsh, O. C.*—New characters of Mosusauroid Reptiles.

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### BOOKS PURCHASED.

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# PROCEEDINGS

## OF THE

# ASIATIC SOCIETY OF BENGAL,

### FOR MAY, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 5th instant, at 9:15 P. M.

H. B. MEDLICOTT, Esq., F. R. S., President in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Director, Cambridge Observatory,—Astronomical observations made at the Observatory of Cambridge under the superintendence of J. C. Adams, F. R. S., Vol. XXI, for the years 1861-65.

2. From the Royal Society of New South Wales,—(1) Report of the Council of Education, New South Wales, for 1878, (2) Annual Report of the Department of Mines, New South Wales, for 1877.

3. From the British Museum,—(1) Catalogue of the Oriental Coins in the British Museum; by S. L. Poole, (2) Illustrations of Typical specimens of *Lepidoptera Heterocera* in the collection of the British Museum, Part III, by A. G. Butler, (3) Illustrations of Typical specimens of *Coleoptera* in the British Museum, Part I, by C. O. Waterhouse.

4. From the authors :—

(1) Introduction to the Study of Sign Language among the North American Indians: by Lieut.-Col. G. Mallery, (2) Sacred Books of the East, Vols. I—III: edited by F. Max Müller, (3) Le dix-septième Chapitre du Bharatiya-Nāṭya-Śāstra, intitulé Vag-Abhinaya: by P. Regnaud, (4) Miscellaneous Essays relating to Indian subjects: by B. H. Hodgson, (5) Instructions for Testing Telegraph Lines and the Technical arrangement of offices, Vol. II: by L. Schwendler.

5. From the Maharaja of Kashmir,—a Hindec Almanac.

6. From Lieut. R. C. Temple,—4 silver and 29 copper coins.

7. From the Home, Revenue and Agricultural Department, (1) *Ostindische Kaste in der Gegenwart*: by Dr. E. Schlagintweit, (2) *The Chronology of Ancient Nations*: translated by Dr. C. E. Sachau.

The PRESIDENT then laid on the table Volume II of the *Antiquities of Orissa*, by Dr. Rájendralála Mitra, which had been recently presented to the Society by the author, and in calling attention to this valuable contribution to the Society's Library, he said:

I have the pleasure of presenting a gift in which the Society may take pride as well as interest. It is the second Volume of the *Antiquities of Orissa* by Dr. Rájendralála Mitra. For five and thirty years Dr. Mitra has, I may say, belonged to the Society. It was to him as a school before he made himself a master in the studies to which he has devoted his life. Although this work has been brought out quite independently of the Society, we may truly say that but for the Society, it would never have appeared. I am not competent to judge of the critical merits of a work of antiquarian research—no doubt this volume will sustain in this respect the reputation of its author—but of its form, I may venture to remark, that it seems worthy of the important object undertaken, to make an adequate permanent record of the wonderful monuments of a bygone attempt at civilization in this country. For such investigation it is especially to be regretted that so few of Dr. Mitra's fellow countrymen have endeavoured to emulate the conspicuous example he has set them, for it is surely to be presumed that, with equal learning, a native must have a great advantage over a foreigner in interpreting the symbols of a mythology and of a social phase, the traditions and the residual customs of which formed the elements of his earliest training. The Society can scarcely show a higher sense of the duties of its position than by the encouragement of native learning.

The following Gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

R. H. MacLeod, Esq., C. S.

Rao Sahib Visvanáth Mandalik, C. S. I.

Babu Taraprasad Chatterjea.

The following Gentlemen are candidates for ballot at the next Meeting—

1. The Rev. J. S. Doxey, Multan, proposed by Col. C. C. Minchin, seconded by J. Crawford, Esq.

2. G. MacDonald, Esq., C. E., Aligarh, proposed by H. Rivett-Carnac Esq., seconded by A. Pedler, Esq.

3. J. G. W. Sykes, Esq., LL. D., Barrister at Law, Lukhnau, proposed by H. Rivett-Carnac, Esq., seconded by A. Podler, Esq.

4. The Giridhararaj of Biswan, proposed by Dr. Rájendralála Mitra, seconded by J. Crawford, Esq.

The SECRETARY reported that Mr. J. C. MacDonald and Col. H. A. Browne had intimated their desire to withdraw from the Society.

The PRESIDENT announced that the Council propose certain amendments to Rules 4 and 46 :

The object of these amendments will be seen from the following circular which was issued to all resident members in compliance with Rule 64 A.

Proposition to increase the strength of the Council.

The peculiar circumstances in which the Society is placed make it very desirable, or even necessary to working efficiency, to increase the strength of the Council.

There are always attached to the Supreme and the Local Governments men whose counsel it is important to secure. With the present limit of the number of the Council to 15 members this advantage cannot be attained, owing to the removal of all the chief offices to the hills during the hot season, whereby the administrative body of the Society would then be left inefficient for the greater part of the year. This difficulty has for some time been partially met by making frequent changes in the Council within the year, but it is not always possible to effect a move of this kind, and the practice is independently objectionable.

The law requiring that the Trustees of the Indian Museum appointed by the Society shall be members of the Council has added greatly to the difficulty under consideration : these four Trustees (or five, when the President is already a Trustee) should be working (and some, at least, non-migratory) members of Council ; and the office-bearers of the Society (the 3 Secretaries) are not always those who can most fitly be nominated as Trustees.

The rule whereby the President must be chosen from the Council has sometimes been felt obstructively ; and, indeed, the object of such a rule is not apparent. This difficulty also would be neutralized if the Council had power to nominate some additional members to its body.

The appointment of these additional members should remain optional, the special object being—to have power in emergent cases to bring in some particular individual without requiring the immediate retirement of some actual member of Council ; but the member so appointed would be as fully and permanently on the Council as any other. The desired relief could not be secured by a less number than five.

The change will require the following alterations of the Rules, (additions in *italics*) :

Rule 4. "The administration, direction and management of the affairs of the Society shall be entrusted to a Council composed of the Council and officers of the Society—namely, a President, three Vice-Presidents, and one or more Secretaries, including the Treasurer—with as many other ordinary members, as shall with these officers make up a minimum total of fifteen, or a maximum of twenty."

"Not more than one of the offices of President, Vice-President or Secretary, shall be held by the same individual ; but the Secretary if there be one, or one of the Secretaries, if there be more than one, shall ex-officio act as Treasurer. The optional vacancies in the Council are intended to provide (under Rule 46) for emergent cases, such as are occasioned by the frequent temporary absence of members, or otherwise."

Rules 46. "In the event of a vacancy occurring during the year in the office of President, Vice-President, Secretary, or Member of Council, it shall be competent to the remaining Members of the Council to fill up such vacancy, subject to the confirmation of the next subsequent Ordinary General Meeting.

*"The Council may also, for specified reasons and subject to the same confirmation, elect additional members, as occasion may require, within the sanctioned maximum number."*

The PRESIDENT invited the members present to make any remarks or suggestions on the proposed alterations, reminding them that under the rules a statement of such objections would have to accompany the voting papers, which would be sent round to all members of the Society.

No remarks or suggestions having been made on the proposals, the President stated that the proposals would be circulated, and the questions would come up again at the July meeting.

The PRESIDENT on behalf of the Council then announced that Mr. A. Pedler had been appointed General Secretary, Member of Council and Trustee of the Indian Museum, on behalf of the Society, in the place of Mr. J. Crawford who had gone to England.

The PRESIDENT also announced that Mr. H. F. Blanford had tendered his resignation as Member of the Council, and Mr. Beverley as Treasurer, and that Mr. J. C. Douglas had been appointed Member of Council and Treasurer in their place.

The SECRETARY announced that the following works had been sanctioned for publication in the Bibliotheca Indica Series :

1. Chanda's Prākṛit Grammar ; edited by Dr. A. F. R. Hoernle.
2. Second Volume (English Translation) of the Ain-i-Akbari ; by Captain H. W. Clarke.
3. Maḡhāzī el Wāqidi ; edited by Mr. C. J. Lyall.
4. Maitrāyaṇi Samhitā ; edited by Dr. L. Schroeder.
5. English translation of the Kathā Sarit Sāgara, by Mr. C. H. Tawney.
6. Viṣṇu Sūtra ; edited by Prof. Jolly.
7. English Translation of the Charaka ; by Dr. Mahendralāla Sircar.
8. Kathaka Grihya Sūtra ; edited by Dr. G. Thibaut.
9. English Translation of the Tarikh-ul-Khulfa ; by Major H. S. Jarrett.
10. Nirukta, with commentary ; by Pandit Satyavrata Samāsrami.
11. Third volume of the Akbar Namah ; edited by Maulvi Abdurrahim.
12. Continuation of the Isabah ; edited by Maulvi Abdul Hai.

Dr. A. F. R. HOERNLE exhibited four silver, and twenty-nine copper coins, and some ornaments received from Lieut. R. C. Temple, and read the following note on them by Dr. Rājendralāla Mitra.

"Two of the silver coins have been so worn out that the legends on them have become illegible. The 3rd is a coin of Ala-uddin Muhammad Shah A. H. 695 to 715. It has been figured by Thomas in his Pathan coins of Delhi, Plate III, fig. 57, page 171. The legend on the fourth is very faint, and I doubtfully take it to be of the same reign but of different type.

"The copper coins are all of the same reign and type, but not of the same date. On some I make out the date to be A. H. 896, in others 905, 914, 917 and 918. They belong to the reign of Sikandar Shah Behlol (Behlodi, Lodi,) and have been figured by Thomas, plate V, figs. 167 and 169, page 366.

"The large ornament is a necklet of a pattern common all over India. The small ones are earrings. They are of no interest except that the like of them may be seen in figures of ancient and mediæval ornaments of the kind."

Dr. A. F. R. HOERNLE read the following Memorandum from Mr. H. Rivett-Carnac, C. S., C. I. E., F. S. A., giving extracts from a letter from Chevalier Hans Hildebrandt, regarding the resemblance between the Swedish Remains and the Indian Pre-historic Tumuli and Markings.

"The following extracts from a letter from the Chevalier Hans Hildebrandt, Antiquary to the kingdom of Sweden, Director of the Royal Swedish Academy of History and Antiquities, in which he notices the resemblance between the Swedish Remains, and the Indian Prehistoric Tumuli and Markings, described in the papers read by me before the Asiatic Society will perhaps be of interest. Referring to the cup-marks, M. Hildebrandt writes :

"The ancient sculpturings on the Indian rocks are highly interesting. Regarded as a whole they are more like to the Scotch sculpturings than to the Swedish ones, as you will see from the enclosed plate, showing some very characteristic groups of the Swedish type.

"The cup-marks occur in Sweden very oft, but seldom or never on slanting surfaces, never, as far as I know, on natural rocks, generally on the uppermost horizontal or quasi-horizontal surface of large or smaller blocks, In one of the volumes of the monthly papers of our academy, which I sent you to-day, you will find such a block with a certain number of cup-marks figured. The cup-bearing blocks are called by the Swedish peasants *elfsten* or stones of the elves. The cups are used as receptacles of offerings. They are greased and in them are deposited small gifts to the supernatural

beings, such as pins, farthings, &c. This custom is in some places retained even to-day. Count G. Essen, who died some years ago, had placed in his park, where only the families of his estate entered, an Elfstone, and after a week he found several deposits in the cups. He took them away, but after another week the cups were rich in small objects. No friend of superstition, he told his labourers that they were not allowed to deposit offerings on the stone. The labourers obeyed but reluctantly. They were persuaded, that the Count had taken the stone from the field and placed it in his park only to have a place of offering continually at hand, and his prohibition to use it was regarded as a proof that he wished to use the said stone only for himself.

“The monoliths are very common in Sweden, but generally very rough. I know only a single instance, where the stone shows a kind of ornament (a spiral line) in the province of Halland.

“Elf cups are often found in Sweden on the covering blocks of our dolmens. The dolmens belong in Sweden exclusively to the Stone-age, but I am not quite sure if the cup-marks on them can be ascribed to so high an antiquity. The cup-bearing blocks could be visible in other prehistoric periods as they are to-day, and in that way they do not necessarily belong to the times of erection of the dolmen itself,”

“It is to be noticed that in some parts of India also flowers and offerings are to be found on the sculptured stones and at Junapancee as in Sweden the cup-marks were as in Sweden generally on the “uppermost horizontal or quasi-horizontal surface of the large or smaller blocks.” In India the rocks with the markings are attributed to the *Pandus*, who although hardly to be regarded as elfs, represent in the minds of the people a supernatural agency.

“Referring to the Tumuli M. Hildebrandt writes :

“The likenesses between your Indian Tumuli and our Swedish ones are of so general a kind, you will find the same arrangement everywhere, that I fear no conclusions are thence to be drawn. But your finds are of the highest interest. Your iron axes have exactly the same type as the very fine metal axes of Europe, the only type seasonable in the age, when man learned to have recourse to metal instead of stone for making an axe. I think we have two ways of explaining this phenomenon. Either your Indian iron-implements have no connection at all with the development of European civilisation, and then they are to be regarded as belonging to a quite distinct civilisation, which, quite independently left the stage of the stone-implements and made itself new ones of metal, of iron, which, to be sure in some regions, for instance in South Africa, has been known and used earlier than copper and bronze. Or your Indian finds belong to the same great wave of civilization we have in Europe, but in India iron was known

very early; already in the very first period of the knowledge of metals, copper or bronze was given up and replaced with iron, a very interesting fact. To choose between the two theories it will be necessary to have the exact date of these finds, and to that end it will be necessary to have some researches more in the same direction.' "

"It is impossible at present to give even approximately the date of the Tumuli—all the people can tell you is that they are prehistoric.

"The following extract regarding the remains of snake-worship in Sweden will be considered interesting :

" 'There is still in Sweden to be found a snake-worship in a tame way. We have in Sweden a quite innocent snake, Swed-Snok (the same word as in English!) which lives in heaps of stones, in the foundations of country-houses &c., and is regarded as a tutelary genius of the house. As a boy I killed a *snok* and was very proud of my bravery, till my old grandmother heard of it and made me so angry reproaches, that I promised never to do so any more. In Pompeii you will find almost in every house the tutelary snakes painted, especially in the kitchens.' "

THE REV. FATHER E. LAFONT, S. J. read the following note on some anomalies he had observed in one of Crookes' Electrical Radiometers, and exhibited to the members the difference in behaviour of this instrument, and that of the ordinary form of electrical radiometer.

An Electrical Radiometer recently made for me by Mr. C. H. Gimmingham the Assistant of Mr. W. Crookes, behaves in a manner so different from that mentioned in the latter's Lecture "On Radiant Matter," that I thought it might interest the meeting to have it exhibited to-night.

According to Crookes, the vanes of his Radiometer revolve when made the negative pole of the Inductarium, but remain perfectly motionless when the current is reversed, and when the vanes become positive. Now in this particular instrument with a weak primary current, the phenomena take place just as they were exhibited at Sheffield, but if more battery power be added, it becomes impossible to prevent the rotation by reversing the current, in both positions of the commutator the luminous appearances and the rotatory movement remain unaltered, except perhaps in intensity.

The explanation of this anomaly is, I think, the following :

We have in the Secondary Coil of our Inductarium, a rapid succession of two induced currents produced by the *closing* and the *opening* of the primary or battery current; but of these two induced currents, that produced at opening is far stronger than the one produced at the closing of the primary. It follows from this, that if a great resistance be interposed between the terminals of the Secondary Coil, the stronger current alone passes, and it is from this that these terminals are usually called *positive* or

*negative.* In the present case an additional battery power very likely so far increases the tension of the weaker current that on reversing the commutator, that current plays the part which usually devolves upon the stronger current alone. The vanes of the Radiometer contain always *negative* electricity, in one position of the commutator from the *direct*, and in the other position from the *inverse* induced current, and when that *negative* electricity has sufficient tension it drives the vanes in both cases. This new fact proves once more the comparative indifference of positive, and the peculiar energy of negative electricity in these highly rarified tubes.

The following papers were read—

*Second Notice of the Coins of the Mitras.*—By A. C. CARLLEYLE, ESQ.  
*Archæological Survey of India.*

(Abstract.)

This paper mainly treats of a new device discovered by the author on some of the Mitra coins, acquired by Mr. Rivett-Carnac on a subsequent occasion, and noticed by him in a paper read at the last meeting of the Society (see Proceedings for April). This device is the recumbent figure of a man, which takes the place of the three symbols on the other coins. The author identifies it as Buddha in his nirvāna, in the same recumbent posture as represented by the colossal statue of the nirvāna, discovered by him on the site of Kusinagara. The paper further shows that all Mitra coins may be divided into three classes, according to their devices on the reverse. The first class has a bull standing; the second, a peacock and palm-tree; the third, a chaitya or stūpa of three semicircular arches. The two latter classes again, show the standing bull on their obverse, while the first class has the Buddhist triśūla in its place. The author states that 14 kings of the Mitra dynasty are now known, whose dates he says range from B. C. 178 to A. D. 144.

This paper will be printed in the Journal, Part I.

2. *On a simple Method of identifying a submerged Telegraph Cable without cutting it.*—By W. P. JOHNSTON, ESQ., *Officiating Electrician, Indian Government Telegraphs.*

(Abstract.)

This paper refers to a simple and very ingenious method for identifying any submerged telegraph cable without making the highly objectionable cut, when the cable has been raised to a boat. For instance, say that there are two identical cables laid across a river, one of which has become faulty, how can the faulty one be distinguished without cutting either cable? Mr. Johnston uses for this purpose a telephone which, as is well

known, is the most sensitive instrument at present available for indicating small currents acting for very short intervals of time. After having given orders on shore that signals are to be sent, only through the good cable, Mr. Johnston attaches a telephone to the wire guards of the raised cable, the distance between the two connecting points being not necessarily greater than 6 feet; if then it should happen that the cable, to which the telephone is attached, is the one through the copper conductor of which signals are being sent, and into the wire guards of which small and opposite currents are consequently induced, and of which currents small portions pass through the shunt formed by the telephone, then every signal sent through the cable can be distinctly read, and the Telegraph Engineer on board knows that he has got hold of the good cable. If no signals can be heard in the telephone, then it is the faulty cable that has been raised to the boat.

The reverse way may also be chosen, by connecting a telephone to the conductor of the cable on shore, and sending signals from a battery on the boat, through the wire guards; in this manner the Telegraph Engineer on the boat has the means of communicating with the shore.

After the paper was read Mr. Louis Schwendler gave a lucid description of this ingenious method for applying the telephone to practical purposes, illustrating his remarks by diagrams on the black board, and carrying out some experiments with a piece of cable as used for Indian rivers. The members present satisfied themselves as to the efficiency of the method, and two signallers of the Government Telegraph Department communicated with each other in the manner above described.

Mr. Schwendler further said that the telephone, although a very interesting instrument and of great practical importance for physical research, appeared to him a most dangerous one from a telegraph point of view, for it could be used for taking off at any point, the messages passing along a line of telegraph, and it could not be detected by the ordinary means of testing. He said it was well known that during the cotton crisis in Bombay, certain people interested in cotton messages, had started an intermediate office in the jungle, by which means they carried off the messages and falsified them; but that if a case of this sort happened now, it would be at once detected by the nearest testing office, whereas by the application of a telephone, acting as a shunt between any two points of a telegraph wire, no such detection would be possible.

The paper will be published in the Journal, Part II.

The following communications have been received:—

*On some Points in the Dentition of Rhinoceros.*—By RICHARD  
LYDEKKER, Esq., B. A.

*On the extra-floral Nectar-glands of Aphelandra cristata,* Robert  
Brown.—By J. WOOD-MASON, Esq.

*On the Genus Choeradodis.*—By J. WOOD-MASON, Esq.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in April last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies and Editors.

Bombay. The Indian Antiquary,—Vol. IX, Part 105, April 1880.

London. Royal Geographical Society,—Proceedings, Vol. II, No. 3, March 1880.

———. Geological Society,—Quarterly Journal, Vol. XXXVI, No. 141, February 1880.

———. Royal Astronomical Society,—Monthly Notices, Vol. XL, Nos. 3 and 4, January and February 1880.

Royal Asiatic Society of Great Britain and Ireland,—Journal, Vol. XI, Part 3, August 1879; Vol. XII, Part I, January 1880.

———. The Academy,—Nos. 412—414.

———. The Athenæum,—Nos. 2735—2737.

———. Nature,—Vol. XXI, Nos. 544 and 545, April 1880.

No. 545. Musical Pitch. *Ellis, A. J.*—The History of Musical Pitch.

Palermo. Società degli Spettroscopisti Italiani,—Memorie, Disp. 10, 11, and 12.

Paris. La Société de Géographie,—Bulletin, January and February 1880.

Roorkee. Professional Papers on Indian Engineering,—Vol. IX, No. 36, April 1880.

Sydney. Royal Society of New South Wales,—Journal and Proceedings, Vol. XII, 1878.

Vienna. Die kaiserliche Akademie der Wissenschaften,—Almanach für 1879.

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Part I, Vol. LXXXVII, No. 5. *Fuchs.*—Studien über die Gliederung jüngeren Tertiärbildungen Ober-Italiens. *Diell.*—Untersuchungen über die Organisation des Gehirns wirbelloser Thiere. I Abtheilung (Cephalopoden, Tethys). *Stossich.*—Beiträge zur Entwicklungsgeschichte der Chaetopoden.

- Vienna. ———. ———. Philosophisch-historische Classe,—Vol. XC, Nos. 1 to 3; Vol. XCI, Nos. 1 to 2; Vol. XCII, Nos. 1 to 8; Vol. XCIII, Nos. 1 to 4.
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## BOOKS AND PAMPHLETS,

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- MALLERY, LIEUT.-COL. G. Introduction to the Study of Sign Language among the North American Indians. 4to., Washington, 1880.
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- SACHAU, DR. C. The Chronology of ancient Nations, an English version of the Arabic Text of the Athár-ul-Bâkiya of Albírúní, or "Vestiges of the East." 8vo., London, 1879.
- SCHLAGINTWEIT, DR. E. Ostindische Kaste in der Gegenwart. Sm. 8vo., Pamphlet.

- The Indian Antiquary,—Vol. IX, Part 105, April 1880.

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- Annual Report of the Department of Mines, New South Wales, for 1877. 4to., Sydney, 1878.

Report of the Council of Education upon the Condition of the Public Schools and of the Certified Denominational Schools, New South Wales, for 1878. Rl. 8vo., Sydney, 1879.

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———. London, Edinburgh, and Dublin Philosophical Magazine,—Vol. IX, No. 55, March 1880.

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No. 1427. Heaton, C. W.—Balmains Luminous Paint.

No. 1429. Haughton, B.—The Best Route for a Line of Railway to India.

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No. 1061. *Meyer, V. and Züblin, H.*—A contribution to the knowledge of Chlorine.

No. 1062. *Meyer, V. and Züblin, H.*—On the density of Bromine Vapour at a Yellow Heat.

*Meyer, V.*—On the behaviour of Iodine at Elevated Temperatures.

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No. 12. *Faye.*—Sur l'origine du système solaire.

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No. 40. *Breguet, A.*—Les Progrès de la télégraphie électrique.

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*Carran, I.*—L'humanité primitive et l'évolution sociale, d'après M. Herbert Spencer.

Journal des Savants,—March 1880.

———. Annales de Chimie et de Physique,—March 1880.

*Amagat, E. H.*—Mémoire sur la compressibilité des gaz à des pressions élevées.

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### BOOKS PURCHASED.

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Fig. 1.

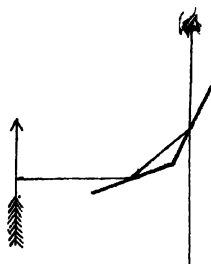


Fig. 2.

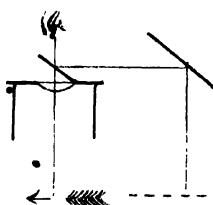
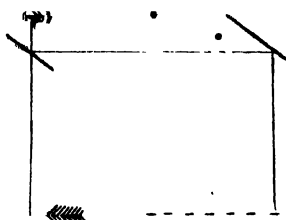


Fig. 3.



Zincographed at the Surveyor General's Office, Calcutta



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 2nd of June, at 9.15 P. M.

H. B. MEDLICOTT, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Edinburgh Botanical Society,—Report on the Temperatures during the winter of 1878-79 at the Royal Botanical Garden, Edinburgh.

2. From the Madras Government,—Standing Information regarding the Official Administration of the Madras Presidency in each Department, by C. D. MacLean.

3. From J. O. N. James, Esq., Assistant Surveyor General,—A Chart of India, in two Sheets.

4. From the Home, Revenue, and Agricultural Department,—(1) Jungle Life in India, by V. Ball, and (2) Select extra Tropical Plants readily eligible for industrial culture or naturalisation, by Baron Ferdinand von Müller.

5. From the Trustees, Astor Library,—Thirty-first Annual Report of the Trustees of the Astor Library for the year ending December 31st, 1879.

6. From the Royal Astronomical Society,—Memoirs, Vol. XL. Observations made during total Solar Eclipses, by A. C. Ranyard.

The following Gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

The Rev. J. S. Doxey.

J. MacDonald, Esq., C. E.

J. G. W. Sykes, Esq., LL. D.

The Giridhararaj of Biswan.

The following Gentlemen are candidates for ballot at the next Meeting—

1. P. Johnston, Esq., proposed by L. Schwendler, Esq., seconded by J. Wood-Mason, Esq.

2. J. M. Coates, Esq., M. D. Principal, Medical College, (re-election), proposed by J. Wood-Mason, Esq., seconded by H. B. Medlicott, Esq.

3. The Rev. Arthur Lewis, B. A., Dera Ghazi Khan, proposed by Lt. R. H. C. Tufnell, seconded by A. Pedler, Esq.

The SECRETARY reported that Mr. W. E. Brooks and the Hon'ble G. G. Morris had intimated their desire to withdraw from the Society.

Dr. HOERNLE exhibited a sealing-wax impression and sketch of a curious gold medal sent for the inspection of the Society by Thos. A. M. Gennoe, Esq., of Fyzabad, and read the following note on it by Dr. R. Mitra, addressed to the Philological Secretary. "I can make nothing of Mr. Gennoe's drawing and sealing-wax impression. The letters are, as you say, too modern to be of 57 B. C., and they do not convey to me the faintest idea of Vikramāditya. I read them very doubtfully *Sri २ sāmijña janhu*, perhaps the name of a Gosain. The thing is not a coin but a medal. The idea of Vikramāditya has probably originated from the skulls on the obverse, but I feel satisfied that the medal has nothing to do with the originator of the Samvat era. It is desirable that the authenticity and antiquity of the thing should be carefully ascertained before it can be published. Mr. Gennoe does not give its history. The Lat character copper-plate palmed on Mr. Smith should put us on our guard."

Dr. Hoernle explained that Mr. Gennoe had thought the object to be a coin of Vikramāditya and of the first year of his era; but that he believed, with Dr. R. Mitra, that it was not a coin but, if anything at all, perhaps a medal of comparatively modern, possibly of quite recent, date. He was inclined to read the legend: श्री २ समी जी जह्नु (or जह्नु), the last word occurring as a Rājput name, and the numeral probably being "2," a common way of indicating the repetition of the preceding word. The medal is about 2 inches across. The obverse shows the walking figure of a man, carrying two skulls, suspended by straps, one from each shoulder. The reverse bears the above-mentioned inscription in large, somewhat illegible, modern Nāgarī characters.

Dr. Hoernle exhibited a MS. of a hitherto unknown Prākṛit Grammar, called Prākṛtānanda by Raghunātha. He stated that the MS., which was lent to him by his friend, Paṇḍit Rāma Miśra in Benares, was a modern Nāgarī copy of an original in Bengālī characters which once belonged to the Bengālī Head-Paṇḍit, Trilochana Bhaṭṭāchārya, at the Court of Dhulip

Singh in Lahore. He had not seen the original, and did not know what had become of it. The Nāgari copy, which was very carefully written, had been prepared for his own use by Paṇḍit Rāmadatta of Amritsar. The MS. bears the following subscription: *iti śrī jyotirvit-sarṣātma-jaraghunātha-kavi-kaṇṭhīrara-virachite prākṛtānande dvitīyaḥ parichchhe-  
daḥ samāptaḥ, prākṛtānandaḥ cha; samvat 1893.* As this subscription shows, the work is divided into two sections; but each section is divided into a number of subsections, which are not numbered, but merely indicated by *iti*; e. g., *iti sandhiḥ* (I, 1), *ity ajantāḥ pumlingāḥ* (I, 2), etc. The work contains no more than Vararuchi's rules, but is not without interest, inasmuch as it completely re-arranges Vararuchi's sūtras on a system resembling that of the Laghu Kaumudī with regard to Pāṇini. The first section treats of Declension, with the exception of the first subsection which is devoted to rules on sandhi. The second section treats of Conjugation. The subsection on sandhi contains the following seven sūtras of Vararuchi in the order indicated: Vr. IV, 1. 12. 13. 14. 15. 16. 17. In the last sūtra, i. e. Vr. IV, 17, the MS. reads correctly भयि (for ययि), which is also the reading of the MS. mentioned in the Proceedings for March 1879 (here called F). It is a curious fact that the readings of that MS. of Vararuchi, which also belonged to Paṇḍit Rāmadatta, as well as the readings of Cowell's MS. W, are found in this MS. of the Prākṛitānanda. Thus, for Vr. 5, 16. this MS. reads जस योच यूलं with MS. F, and adds पाठांतरे तु । जस यो वो बात्तं यूलं च with MS. W. Again after Vr. IX, 10 it adds, with MS. W, the sūtra अञ्चो अञ्चो दुःखाच्चेपविस्त्रापनेषु, and adds a long remark to explain the repetition of अञ्चो. Again for Vr. VIII, 37. its commentary runs thus वि चये । अस्य भिज्जा इत्यादेशः स्यात् ॥ चयति भिज्ज इ भिज्जा ॥ बिज्जभिज्जावयेके, as in MS. F; (or भिज्ज, भिज्जइ, भिज्जा; the letters are not quite distinct. In Vr. VIII, 69 it reads णिञ्जइ. For Vr. VIII, 7 it reads, with MS. F, णुदो ज्ञोणः and example ज्ञोणइ, but adds, with MS. W, णोञ्ज इति पाठे णोञ्जइ. In Vr. VIII, 59 it reads दुहि-लिहि-वच्चा दुब्भ-लिब्भ-वब्भा; and examples दुब्भइ लिब्भइ; the conjunct भ is unmistakable, भ being written very differently. These are only a few of its noteworthy readings. The following may serve to show the arrangement of the Grammar. The second subsection of the first section treats of the declension of masculine nouns ending in vowels. It contains 145 of Vararuchi's sūtras in the following order: Vr. V, 1. II, 42. II, 2. VI, 63. V, 2. V, 11. 12. V, 3. 4. 5. VI, 64. V, 8. V, 6. 7. V, 9. V, 13. V, 10. V, 27. IV, 6. I, 1. I, 3. I, 29. III, 62. II, 8. III, 3. III, 50. III, 1. III, 15. III, 64. II, 31. III, 2, &c., &c. Then follows a subsection on feminine nouns ending in vowels, and another on neuter nouns ending in vowels. Then follow three subsections on masculine, feminine and

neuter nouns ending in consonants ; and one more on indeclinables. The second section treats in six successive subsections on the following tenses ; *lat*, *lit*, *lut*, *lṛt*, *lot* (with *lan*, *lin*, *ásirlin*), *luṇ*. Then follow ten subsections on the irregular verbs, arranged according to the 10 classes. Then come two subsections on the formation of the Causal and the Passive. Lastly there is one subsection on the derivation of words by nominal suffixes ; this contains the following sūtras : Vr. VIII, 2. VIII, 5. VII, 82. VIII, 62. VIII, 55. IV, 23. VIII, 16. IV, 24. VII, 10. The last three sections of Vararuchi's Grammar on the subordinate Prākṛit dialects are omitted in the Prākṛitānanda, which accordingly might be thought to be incomplete, but for the final statement in the subscription above quoted. A copy of the MS. of this work has been retained by Dr. Hoernle.

DR. HOERNLE exhibited some brass coins found in a well near the Grand Trunk Road and read a memorandum on the same by H. Rivett-Carnac, Esq.

Mr. Rivett-Carnac says :

I submit for the inspection of the Society specimens of brass coins made over to me by Mr. D. T. Roberts, C. S.

Upwards of 1½ maunds weight of these coins were recently found in a well near the Grand Trunk Road in the Fatchpur District, N. W. P.

They were found in bulk, *i. e.*, loose, and not in a bag, or box or earthen pot. Dr. Rudolf Hoernle to whom I sent two or three specimens for identification has pointed out that they are Chinese coins of the type described by Marsden p. 828 and are of king Kienlong, or Kaontsouzshen of the Manchu Dynasty who reigned up to 1795, A. D. and of King Kiakung son of the preceding king.

I now send a considerable number, many of which seem to bear different legends. On one side the letters are distinctly Chinese. On the other they bear a striking resemblance to Arabic characters. It is difficult to account for this large find of Chinese coins in a well on the Grand Trunk Road.

MR. WOOD-MASON exhibited a small collection of Butterflies from the Andamans and read some notes thereon by Mr. de Nicéville and himself.

Thirty-five species only are included in the present list, of which one is an apparently new species of *Papilio* closely allied to the continental *P. antiphates*, of which it appears to be the Andaman representative, and from which it differs in the much greater extent of the black bands of the forewings, and the much more strongly expressed black markings, the more extensive grey area, and the black-mottled median area of the hind-wings.

The name *P. læstrigonum* is proposed for the species, to indicate its affinity to the mainland form.

These notes will be published in the Journal, Part II.

The following papers were read—

1. *Notes on the Dentition of Rhinoceros.*—By R. LYDEKKER, Esq., B. A.
2. *On the Extra-floral Nectar-Glands of Aphelandra tetragona.*—By J. WOOD-MASON, Esq.
3. *On the Species of Choeradodis, a Genus of Mantodea common to India and Tropical America.*—By J. WOOD-MASON, Esq.

These three papers will be published in the Journal, Part II.

4. *Note by H. F. BLANFORD, Esq., F. G. S., A. R. S. M., &c., to accompany some drawings of large Hail-stones by COL. H. H. GODWIN-AUSTEN, and S. E. PEAL, Esq.*

The figures of large hail-stones which accompany this note (Plates II and III) were communicated to me at an interval of three years, by Col. Godwin-Austen and Mr. Peal, and are of interest as affording characteristic specimens of the form and structure most common in hail-stones of large size in India. The stones (Plate II), figured by Col. Godwin-Austen, fell at Calcutta on the 16th—17th March 1877, in a storm which was remarkable for the unusual lateness of the hour. It commenced a few minutes before midnight, and the hail continued to fall for about a quarter of an hour, accompanied, as is usual, by rain, and violent gusts of wind. In a paper by Dr. Buist, published in the British Association Report for 1855, the author quotes a remark of Dr. Spilsbury to the effect that of 30 storms recorded by him in India, only 3 occurred after dark and none later than midnight, and in my own experience, I do not recollect any previous instance of a hail-storm at so late an hour.\* The stones presented one somewhat unusual feature, *viz.*, radiating prominences of transparent ice, in some cases sub-angular and more or less conical, but in many instances cylindrical or club-shaped, some striking specimens of which form are represented in Col. Godwin-Austen's figures. It is probable that the rounded contours are due to the partial fusion of the ice; but I could not detect in any of the more angular prominences the characteristic hexagonal crystalline form of water. All the specimens figured, and those obtained by myself in this fall had a large nucleus of opaque ice surrounded by a thick transparent coating. Three of the stones figured are

\* Since the above was written I have experienced a hail storm at Simla at three o'clock in the morning. The above remark still holds good for the plains however.

larger than any observed by myself. Of those which I collected, five yielded on fusion, three fluid ounces of water.

The stones figured on Plate III from drawings by Mr. S. E. Peal, fell on the 11th April 1880, at 5 p. m. at Sapakattie in Upper Assam, and the drawings were accompanied by a few brief notes which I embody in the following remarks :

Two stones weighed 700 and 720 grains respectively and measured  $5\frac{1}{2}$  and 6 inches in circumference. Mr. Peal remarks that many were probably far larger. In form they varied from globular to egg-shaped and oblate. The surfaces were generally white and bluntly angular. Fig. 1 represents the external appearance of an ovate-stone. Figs. 2 to 5 the appearance of sections obtained by a man rubbing the hail-stone in his hands, and melting two sides only, until the mass was reduced to a thin lenticular disk. Fig. 2 represents the internal structure thus developed, the shaded parts being clear translucent ice with a radial structure, the white or whiter portions more or less opaque, when held up to the light. The majority, as in figs. 2, 3 and 4, had a dead white nucleus, surrounded by translucent ice, with, in all cases, radial markings. Some, like fig. 5, showed concentric lamination, consisting of white and translucent ice alternately in close concentric layers ; and between 20 and 30 per cent. had a transparent central nucleus about half an inch across. Mr. Peal further observes that the majority appeared to be light, as judged by their size, and they fell with less impetus than might have been expected. The wind was from the North at the time.

I have already remarked that these stones exhibit for the most part the form and structure most characteristic of such large hail-stones as have come under my observation in India. All that I have ever seen are more or less oblately spheroid or discoid, having sometimes a central depression on each of the flatter surfaces. Stones of a conical or conoidal form which appear to be not unfrequent in Europe, and which one recent writer has described as typical, I have never yet seen in India.

5. *Memorandum by H. RIVETT-CARNAC, Esq., C. S., C. I. E., F. S. A., on Clay Discs, called "Spindle Whorls," and Votive Seals found at Sankisa, Behar ; and other Buddhist ruins in the North Western Provinces of India.*

The object of this paper is two-fold. It first describes minutely the objects named in the title ; afterwards it points out many points of resemblance between them and the objects discovered by Dr. Schliemann in his excavations at Hissarlik. For the latter purpose copious extracts are given from Dr. Schliemann's work on Troy.

Some conversation took place regarding the subject of this paper. The general opinion seemed to be, that it would be desirable to have some further information as to the authenticity of some of the objects, brought in by the villagers as "antiquities."

This paper will be published in the Journal, Part I, together with a Plate of discs and seals.

At the close of the meeting a collection of Sonthál, Bhootea, Gáro and Nágá weapons &c., sent by Mr. Robertson Pughe was exhibited. The collection was made up of the following articles.

•  
*Sontháls.*

A. A Sonthál bow and arrows. In some of the arrows the pith of a plant is used instead of feathers. The arrow with a wooden head is used for knocking over small birds.

B. Axes or "tangis."

C. Flute.

D. Cymbals.

•  
*Bhooteas.*

E. Bhootea helmet, the owner of this was killed at the attack on Chamoorchee stockade, December 1864.

F. Bhootea shield (probably bought in our territory) and

G. Bhootea straight sword worn on the right hip. This was captured at Domohoni stockade, December 1864.

•  
*Gáros.*

H. Gáro shield with tuft of bear's hair.

J. The universal Gáro sword.

K. Gáro spears.

L. Gáro pipe.

•  
*Nágás.*

M. Nágá "dao," or sword, ornamented with goat's hair.

N. Nágá spear. At 40 yards the Nágás are dead shots with this weapon.

O. Lepcha knife.

P. A knife belonging to one of the Upper Assam Hill Tribes probably the Khamptis.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in May last,

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies and Editors.

Bombay. The Indian Antiquary,—Vol. IX, Part 106, May 1880.

*Branfill, Col. B. R.*—The Gangai-Kondapuram Saiva Temple. *Richards, Rev. W. J.*—Notes on the Tanḍū Pulayans of Travankore. *Hoernle, Dr. A. F. R.*—Notes on a Rock-cut Inscription from Riwā. *Beal, Rev. S.*—Remarks on the word Sramana. *Fleet, J. F.*—Sanskrit and old Canarese Inscriptions, Nos. LXXVI to LXXIX.

Brussels. Société Royale des Sciences de Liège,—Mémoires, Vols. VII and VIII.

Vol. VII. *Koninck, L. G. de.*—Recherches sur les fossiles paléozoïques, de la Nouvelle-Galles du Sud (Australie).

Vol. VIII. *Eichhoff, W.*—Ratio, Descriptio, Emendatio Eorum Tomicinorum qui sunt in Dr. medic. Chapuisii et autoris ipsius Collectionibus.

Buda Pest. Hungarian Academy,—Almanach, 1879, 1880.

———. ———. Értekezések,—Vol. VII, Nos. 3—10; Vol. VIII, Nos. 1—4.

Értesítője,—Parts 1—7, for 1878; and 1—6 for 1879.  
Évkönyvei,—Vol. XVI, Nos. 2—5.

Literarische Berichte,—Vol. II, Nos. 1—4; Vol. III,

Nos. 1—4.

Nyelvemléktár,—Vol. VI.

Nyelvtudományi,—Vol. XIV, No. 3; Vol. XV, Nos.

1—2.

Calcutta. Geological Survey of India,—Memoirs, Vol. XVII, Part 2.

*Wynne.*—Trans-Indus extension of the Punjab Salt Range.

———. Indian Meteorological Memoirs,—Vol. 1, Part 4.

The Winds of Kurrachee.

———. Register of Original (Meteorological) Observations in 1879, reduced and corrected,—February and March 1879.

———. The Mahābhārata,—No. 46.

Edinburgh. Botanical Society,—Transactions and Proceedings, Vol. XIII, Part 3.

*Brook, G.*—Notes on the Salmon Disease in the Esk and Edon.

*Christison, Sir R.*—The exact measurement of Trees. The Yew Tree. The Fortingall Yew.

Edinburgh. Royal Society,—Proceedings, Session 1878-79.

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*presented by the Author.*

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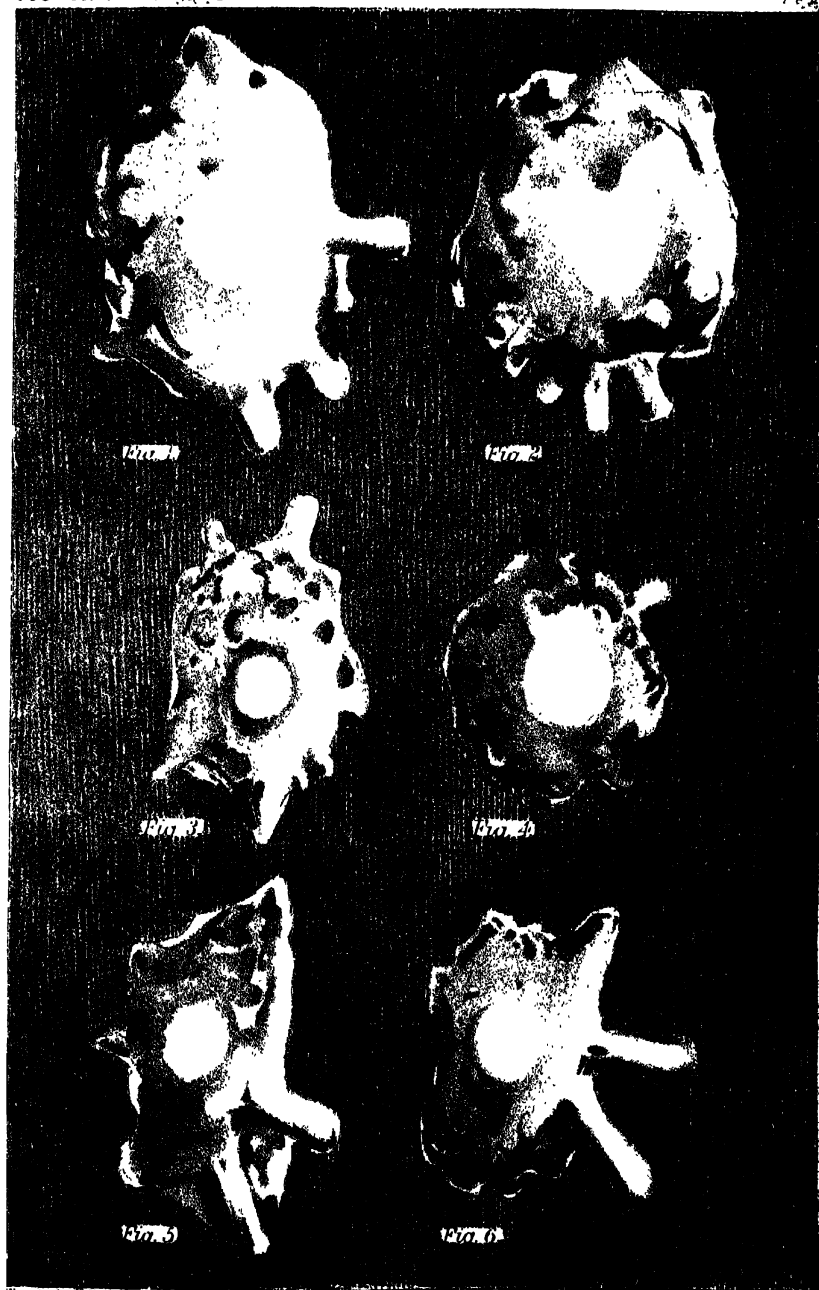
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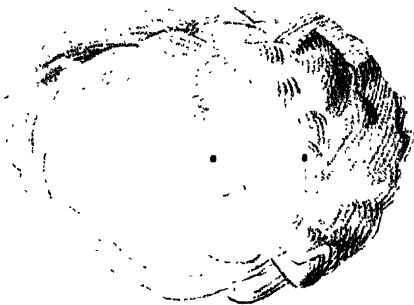


Fig. 1

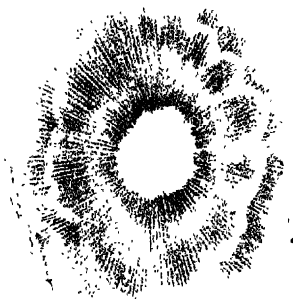


Fig. 2



Fig. 3

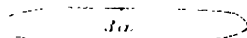
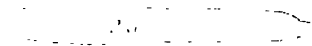
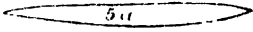
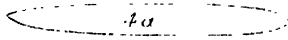


Fig. 4



Fig. 5





PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 7th of July, at 9.15 p. m.

II. B. MEDLICOTT, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Superintendent Marine Survey Department,—A Chart of (1) Dabhol and entrance to Washishti river, (2) Kundari Island to Chaul, and (3) Salāya or Sernia.

2. From the Numismatic and Antiquarian Society of Philadelphia,—Some Monetary Questions viewed by the Light of Antiquity, by R. N. Toppan.

3. From the Editor,—Sanskrit Dictionary, by Hem Chandra, edited by Dr. Ram Das Sen.

4. From the President of the Anjuman-i-Panjab,—(1) Proceedings of the Anjuman-i-Panjab in connexion with the proposed bill for the appointment of persons to the office of Kāzi, and (2) Report of the Oriental College, Lahore, for 1879.

5. From the Madras Government,—(1) Three Maps and twenty-three Photographs, and (2) Lists of Sanskrit MSS. in private Libraries of Southern India, Vol. I, by Dr. G. Oppert.

6. From the Department of the Interior, U. S. America,—(1) Tenth Annual Report of the United States Geological and Geographical Survey of the Territories for the year 1876, by F. V. Hayden, and (2) Catalogue of the Publications of the U. S. Geological and Geographical Survey of the Territories. Third edition.

7. From the Comptroller of the Currency, U. S. America,—Annual Report of the Comptroller of the Currency to the Second Session of the 46th Congress of the United States, December 1st, 1879.

8. From the Zoological Society of London,—List of the Vertebrated Animals now or lately living in the Gardens of the Zoological Society of London. First supplement, containing additions received in 1879.

9.<sup>1</sup> From the author,—A comparative Grammar of the Gaudian Languages with special reference to Eastern Hindi, by Dr. A. F. R. Hoernle.

10. From the author,—Tenth Annual Report on the Health of Salford, for 1877-78, with statistical abstracts for 1869-78, by Dr. J. Tatham.

The following Gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

P. Johnston, Esq.

J. M. Coates, Esq., M. D. (re-election).

The Rev. Arthur Lewis, B. A.

The following Gentlemen are candidates for ballot at the next Meeting:—

1. Pandit Mohanlal Vishnupal Pandia, proposed by Dr. R. L. Mitra, seconded by A. Pedler, Esq.

2. The Hon. J. Gibbs, C. S. I., M. R. A. S., Simla, proposed by H. Rivett-Carnac, Esq., seconded by Dr. G. Thibaut.

3. Rajá Siva Prasad, C. S. I., Benares, proposed by H. Rivett-Carnac, Esq., seconded by Dr. G. Thibaut.

4. J. A. Brown, Esq., C. S., Benares, proposed by H. Rivett-Carnac, Esq., seconded by Dr. G. Thibaut.

5. W. Lamb, Esq., C. S., Jaunpur, proposed by H. Rivett-Carnac, Esq., seconded by Dr. G. Thibaut.

6. H. W. W. Reynolds, Esq., C. S., Jaunpur, proposed by H. Rivett-Carnac, Esq., seconded by Dr. G. Thibaut.

The SECRETARY reported that the Hon'ble J. S. White had intimated his desire to withdraw from the Society.

The PRESIDENT announced that, in accordance with the notice given at the May meeting, the votes would be taken on the proposed amendments to Rules 4 and 46.

Messrs. Waldie and Blackburn were appointed Scrutineers, and reported that the votes were one hundred and eleven for, and one against the amendments.

The PRESIDENT announced that the amendments were carried.

The SECRETARY laid upon the table the following publications of the Society which had been published since the meeting held in June last:—

(1) Journal, Vol. XLIX, Part I, No. 1, (2) Journal, Vol. XLIX, Part II,

No. 1, (3) Shaw's Turki Vocabulary which has been issued as an Extra No. of Part I of the Journal, and (4) Proceedings for April and May 1880.

Dr. A. F. R. HOERNLE read a Memorandum by Mr. H. Rivett, Carnac, supplementary to the one read at the last meeting, on Clay Discs, Spindle Whorls, &c.

This paper will be published with Mr. Carnac's first paper on the same subject in the Journal, Part I.

Dr. A. F. R. Hoernle exhibited four gold and four silver coins, Bactrian and South Indian, sent by Major-General G. G. Pearse.

GENERAL PEARSE writes—

I have the honor to forward for the inspection of the members of the Society a gold Rama Tunka coin which I have lately procured here. There are several of these coins in the Mysore country.

I trust it may be figured in our Journal, for if not now read, hereafter it may be so. Unless it has already been published and is no novelty.

I believe that the flat Rama Tunkas are the most modern ones, and that the cup-shaped ones are the oldest; these last I attribute to the age when cup-shaped coins were prevalent in Byzantium, *i. e.*, from the 10th to the 14th centuries A. D. The oldest Rama Tunkas, I believe, may be attributed to the Jain or Hoysála Bállála dynasty of Hüllabed or Dwara-vati or Dorasamudra in the present Mysore territory. This dynasty flourished from the beginning of the 10th century till A. D. 1310, when the Ghilzye Muhammadan General Kafúr from Delhi sacked the capital.

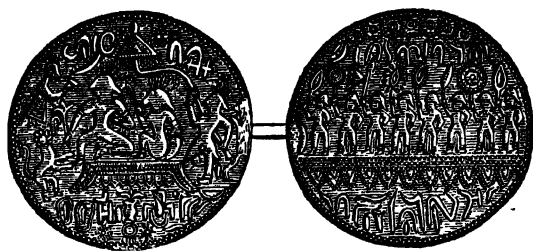
The Vijayanuggur dynasty arose after the fall of the Hoysála Bállálás in A. D. 1336, it lasted till A. D. 1565 when it fell before a Muhammadan confederacy at the battle of Talikota, near Raichore, on the 25th January, 1565.

I attribute the later cup-shaped Rama Tunkas and all the flat ones to this great Vijayanuggur dynasty.

From the Vijayanuggur dynasty have indirectly sprung those of Mysore and other Southern Indian ones. This explains why remains of the Hoysála Bállála and Vijayanuggur dynasties are found in the Mysore territories.

The last king of Vijayanuggur was Rama Raja, he was killed at the battle of Talikota. Here, not knowing why, the people attribute this enclosed Rama Tunka to this prince. They may have reason.

The coin is of considerable interest, for, as will be seen in the annexed wood-cut, apparently characters of three different languages are figured on it, none of which seemingly can now be read here.



I describe the coin as follows :

Gold Rama Tunka, coin of Vijayanuggur.

Size, Mionnet's scale, nearly 10.

Weight 12.281 grams or 189.52 grains.

Age, Circa A. D. 1564.

*Obverse.* Rama and Seeta, seated on a throne, on the right a supporter upholds a royal umbrella; this is probably meant for Rama's ally Vibhishana the brother of Ravana. On the left, a lion and a monkey, this last probably meaning a Dravidian or a Rákshasa, are supporters. Above them may be letters or symbols? there is a star. Below them may be letters or symbols? There are an altar, a necklace and stars.

*Reverse.* Here there are eight figures all upholding various kinds of regal umbrellas of the peacock feather kind, such as are still in use in Southern India. These possibly depict the servants or followers of either Rama, or the king who struck the coin. Above these eight figures is decidedly an inscription, if looked at facingly, *i. e.*, in the usual way, it looks like Pehlevi: such I cannot conceive it to be. If the coin is turned upside down, the inscription looks like blundered Persian. Below the eight figures is what seems an inscription of a Javanese or Assamese type of Nagri.

The coin is in excellent preservation, every letter being perfectly legible.

Further I forward for the inspection of the members—three beautiful gold coins, all are I believe unique. They were found in the year 1878 in the river Oxus near Kúndúz in an old deserted Fort.

1. A stater and a half(?) of Diodotus, King of Bactria, with emblems of Antiochus.

2. A stater of Odgoras, a Scytho-Greek king.

3. A stater with Arian inscriptions of a Scythic king.

In a second communication relating to the same subject, General Pearse writes—

“In continuation of a late note of mine submitted when forwarding some gold coins, I have the honor to inform you that several more gold coins of the Oxus hoard are falling into my hands, amongst them that very rare coin, the Stater of Enthydemus. The specimen in my hands is in very good preservation and is of beautiful workmanship, but it has seen some circulation.

"The Staters of Antiochus and Diodotus are all new coins and in perfect preservation.

"I have another of those Stater and a half coins of Diodotus and Antiochus of which I have sent you one. I observe that like the one sent you, it is much worn, *i. e.*, used; this is very worthy of notice. The one I have with me is much more worn than the one with you."

Impressions of these coins were submitted to General Cunningham for his inspection, and his opinion of them will be gathered from the following remarks which he has sent to the Philological Secretary.

"I am sorry, for General Pearse's sake, to tell you that three of the gold coins of which you have sent me impressions are forgeries. The large Rámatanka is of course a genuine coin. Of two of his coins I possess the genuine originals from which the forgeries have been made.

"No. 1. Head of a king bearded, with victory in a 4-horsed chariot in the reverse, and the legend ΟΑΓΟΡΟΥ. I have already seen five of these forged coins. The forger luckily did not know Greek. My genuine coin has the beginning of the name cut off, as follows:

ΑΝΔΡΑΓΟΡΟΥ

"The forger took the remainder as the complete name, and made the impossible name of ΟΑΓΟΡΟΥ.

"No. 2. Head of Alexander with lion's scalp as Hercules. *Rev.* Victory—ΔΙ—. I have a genuine large double stater of these types; and as I know that forgeries have been made from it, I conclude from the evil company in which it is found, that General Pearse's coin must also be a forgery.

"No. 3. Head of Parthian king—Victory in chariot—with 2 inscriptions one on each side, not yet read. The original genuine coin is in the British Museum. I take General Pearse's coin to be a forgery from the impression which you have kindly sent me. In this I see that the horse is represented in *outline* which, as far as my experience goes, stamps the coin as a rank forgery.

"For several years past whenever a new coin has been found, it has always been followed by a number of forged copies. I pay large prices for the genuine coins—and so does the British Museum—and rare coins are not to be obtained now, except by chance, for even moderate prices."

Dr. A. F. R. Hoernle exhibited eleven gold coins, Roman, Indo-Scythian and Gupta, belonging to Colonel Berkeley, sent by Mr. H. Rivett-Carnac, C. S., C. I. E., &c.

Mr. Carnac writes the following note on these coins:—

"I send for the inspection of the Society eleven gold coins, which were discovered together with a quantity of gold mohurs by Col. Berkeley, Political Agent, in a subterranean Treasury at Rewah soon after the death of the late Maharajah.

"One of these coins is a Gupta. Eight of them are Indo-Scythie, the remaining two are Roman.

"I confess that at first some of the coins seemed to have been cast. And I supposed that they had perhaps been brought to Colonel Berkeley by Bombay traders. In this case they would have been very suspicious. But the manner in which they have been found, makes it I think, much less probable that they are forgeries.

"Some of them too have been used for necklaces and are much worn on one side.

"I should be much obliged if Dr. Rudolf Hoernle or Dr. Rājendralāla Mitra will examine these coins and favour Colonel Berkeley and the Society with their opinions on them.

"If any of them are rare, Colonel Berkeley would I am sure be glad that they should be figured as well as described in the Society's Journal."

Dr. Hoernle made the following remarks:—the Gupta coin is probably one of Chandra Gupta II; it has the legend श्री विक्रम *Śrī vikrama* (with double k). The Indo-Scythian coins are of Kanerki and Iverki, all well known. Of the two Roman coins one is of the Emperor Commodus, of about A. D. 190, described in Akerman's *Roman Coins*, Vol. I, pp. 303, 307. The other is of Clodius, the short-lived rival of the Emperor Severus who perished in battle A. D. 197. The reverse of this coin shows a genius with radiated head, and the legend SÆCVLO FRVGIFERO Cos II. Akerman in his *Roman Coins* mentions no gold coin of this kind, but he does describe a *very rare* brass coin, agreeing with this coin in every respect (see Vol. I, p. 339); moreover he also describes a *very rare* gold coin, which agrees with the present coin in every respect, except that, on the reverse, it reads SÆCVLIQ instead of SÆCVLO. Adding to this, that the present coin still bears distinct traces of its having been cast in a mould; there can be no doubt, that it is a forgery, a gold coin imitated from the rare brass coin. The other Roman coin and one or two of the Indo-Scythian ones also have a suspicious look, and having been found in company with an undoubtedly forged coin, their genuineness is questionable.

Dr. A. F. R. HOERNLE exhibited four coins of various sorts sent by Mr. V. A. Smith who writes the following note on them:

"I enclose a gold coin which I hope you will kindly identify for me. I believe it is one of the very rare Chandel coins but, after careful comparison of it with a gold coin of Madana Varmma and a copper one of Jaya Varmma (for which I am indebted to General Cunningham), I cannot make out the Rāja's name.

"I also submit some other coins in hopes that they may be of some interest.

"No. 2 is a curious looking old coin but so much damaged as hardly to be recognizable.

"No. 3, with its Greek legend *Μεγας βασιλευς* is, I suppose, Bactrian, but whether common or not, I do not know.

"No. 4 is much worn, and its outline has been destroyed, but a few legible characters may suffice to identify it.

"No. 5, is a fine silver coin of Sher Shāh's.

"Should this or any of these other coins be desired by the Society, they are at its disposal."

The coins were sent to Dr. Mitra for identification, and he recognizes them as—

No. 1. Gold. Old Hun Dināra. Carnatic.

No. 2. Varaha coin. श्रीमदादिवराह.

No. 3. Soter Megas.

No. 4. Kota, Rao of 191 ? (the fourth figure is either 2 or 9) Samvat.

No. 5. Sher Shāh.

The PHILOLOGICAL SECRETARY, in Dr. Mitra's absence, exhibited a palm-leaf MS. of the *Setubandha*, 672 years old. Dr. Mitra has communicated the following note on this MS. :—

The codex comprises 86 folia, each measuring 14 × 2 inches. Its material is palm-leaf, having the edges rounded by the ravages of mice, and the centre perforated for a string to tie the leaves together. Each page bears five lines of writing in the Bengali character, interspersed with interlineations and marginal notes written in very minute but perfectly clear and well-formed letters. The language of the work is Prākṛit, but the notes are in Sanskrit. Its subject is an epic poem on the invasion of the Island of Ceylon, by Rāma, as described in the Rāmāyaṇa of Vālmīki. The work is ascribed to Pravarasena, of Kāśhmīr, who reigned about the middle of the 4th century. It is held in high esteem by Sanskrit scholars, but MSS. of it are exceedingly rare. An excellent edition of it by the learned Professor Siegfried Goldschmidt, of Strassburg, has, however, lately made it easily accessible to students.

The name of the work is not always given in the same form. It is usually quoted under the name of *Setubandha*, or the "Marine Causeway," but in the colophon of Professor Goldschmidt's edition the homonym, *Setusaraṇī*, has been preferred. It is also known under the names of

*Rāvanavāho*, the "Destruction of Rāvaṇa," and *Daśamukhavaho*, "the Destruction of the ten-headed monster."

There are three commentaries extant on this work, the first two of which, by Rāmadāsa (*Setupradīpa*) and Kṛṣṇa (*Rāmasetu-vivaraṇa*) respectively, have been noticed by Professor Goldschmidt. The third, by Kulānātha, is exceedingly rare, and of it the only MS. I have seen is now in my possession; it is entitled *Rāvanabadha-ṭikā*. I intend shortly to send a copy of it to the learned editor. The fourth occurs in the Library of the Sanskrit College of Calcutta, and is entitled *Setuchandrikā*. There is also in that Library a Sanskrit paraphrase of the work, but the codex is very defective, wanting both the beginning and the end, and I have not been able to ascertain its name.

The most important circumstance connected with the codex under notice is its date. This is given in Prākṛit thus:

सिरि लक्ष्मणस्स अमदेस सुवहरे राज्ञ वेविद्द ।  
पोससि-सुरनन्दसि सुपचे चदमस दिन्सचे ।  
दोस्सं-विस्सागमे लिखितासो वानीनाथेनेति ॥

Two of the words in this extract are not intelligible to me; but the purport of the whole is clear enough;—it means that the MS. was completed by one Vānīnātha, on Monday, the 16th of the waxing moon in the month of Pausa, (*lit.* when the sun sojourned in the constellation Pūsyha), of the year of the king Lakshmaṇa 102. The figures of the year are given in three words *dosa kha vissa* which *dosa* means the "arms" = 2; the second *kha* "sky" = a cypher; and the third *vissa*, the "universe" = 1. They have, according to the usual rule, to be read from the right side. I have elsewhere noticed that the era of Lakshmaṇa Sena begins from the year 1106, (Journal, Vol. XLVII, p. 399), and the date, therefore corresponds, with A. D. 1208. This gives to the codex an age of 672 years.

Of Nāgarī MSS. I have seen two or three works of an older date, but in the Bengali character this codex is the oldest that has come under my notice. It shows that seven hundred years ago, the Bengali letters were exactly of the same type as they were a hundred years ago, or until they were modified by the type-founders of Serampur at the close of the last century. The only peculiarities observable in the codex are—1st, the formation of the letter **ঐ**, which is indicated by a dot in the centre of **৐**; 2nd, the letter **ঐ**, which is shaped like the Nāgarī letter; and 3rd, the **৐** which is formed by putting a horizontal line within **ঐ**, thus **ঐ**. This last form was current even at the beginning of this century. This shows that the present Bengali character, though formed on the model of the Nāgarī, has had a currency, distinct and independent without any change, for a period of seven hundred years, and looking to the uniform well-defined configuration of the letters in the MS. it would not be unreasonable to suppose that it had an independent existence for a considerable time before that period. It is impossible

to believe that the character came into currency ready-formed and fully developed in the time of Lakshmana Sena. Doubtless the Buddā inscription of the Pāla era, and the Sena copper-plates hitherto discovered, are in the Deva Nāgarī type of some kind or other, but not in the Bengālī as it appears in the MS.; but that must be accounted for on the supposition, either that the Nāgarī was believed to be the most appropriate for Sanskrit records, or that for lapidary purposes the angular Nāgarī was preferred or better suited than the comparatively more cursive Bengālī.

Looking to the unchanging currency of the Bengālī character, for so long a period, the question may be asked, were the durations of the characters which had been current before it fully or nearly as protracted? The question is a most important one for the satisfactory settlement of dates from the forms of letters, and its solution is yet a desideratum. James Prinsep was the first to notice the subject in connexion with his researches into the dates of ancient inscriptions. He devised a system of palæographic chronology in which the style of the writing was taken as an index to the age of the document in which it was found. His plan was matured after a careful examination of a considerable number of ancient inscriptions and coins, and recorded in two tables, (Journal, Vol. VII, plates XIII and XIV,) in which different centuries were assigned each a particular set of characters. The materials available to him were, however, not large, and, doubtless, he took his tables to be merely tentative, subject to considerable corrections and modifications resulting from subsequent researches; for it is difficult to believe that he took each particular set of characters to belong to one particular century and no more, or assumed that the same character was common over all the Sanskrit regions for a given period. Change in the style of writing, like that in language, is a slow process, governed by a variety of causes, which tend to retard or accelerate its course, and, except in local and individual peculiarities, no marked divergence is perceptible until after periods which must, in the ordinary course of human progress and irrespective of extraordinary commotions or sudden changes in the material or instrument of writing, be reckoned by centuries, and not by years. Nor do the causes which produce the change operate with equal force every where, nor are the same causes in full operation in all places at any given time. Some of them are in some places more potent than in others, and various circumstances tend to accelerate or retard their action. Hence it is that we find that a particular style of writing, while predominating in some places, is dying out in others. The history of the German and the English characters in Europe affords a singular illustration of this fact.

The number of Indian inscriptions discovered since Prinsep's time is large, but little has as yet been done to systematize the information collect-

ed. The only work of importance published since Prinsep's days is Dr. Burnell's "Southern Indian Palæography;" but it has not contributed much to elucidate this phase of the question. In fact, our discoveries, though large, are not yet sufficiently varied and extensive to admit of a satisfactory solution as to how far styles of writing may be relied upon as guides to chronology. This has, however, not been borne in mind by many orientalists, and much mischief and considerable misunderstanding have thereby been caused in connexion with Indian dates. The practice of taking a dated inscription as a guide, and assuming all undated records written in its character to be of that date is becoming too common. Some renowned antiquarians have adopted this course of proceeding, and I must frankly confess, to my regret, I have myself sometimes followed their lead. It is, however, not the less reprehensible on that account. It leads to the same error, which would have resulted if the MS. under notice had not been a dated one, and I had, comparing it with a dated MS. of the 17th century which I have now before me, pronounced it to be of that age; and this is exactly the kind of mistake which has of late been committed repeatedly in connexion with what Prinsep called the Cave and the Gupta characters; and, in the hands of persons who do not themselves read inscriptions, the names become the veriest Will-o-the-wisps. With them every inscription in the Gupta type must be of the 6th century, because some one has discovered a dated record in that character. The Bādāmi inscriptions for instance. Others, taking the Manadeva inscription, dated Samvat 386 = A. D. 329 (*Indian Antiquary*, IX, p. 163), or the Jayavarmā inscription of A. D. 356. (Samvat 413) or the Vasantasena record of A. D. 378, (Samvat 435) as their guide, may put down the Gupta to the 4th century, and pronounce all records in that character to be of that age. This can only lead to the confusion, and not to the elucidation, of Indian history. Lately I had occasion to protest against an attempt to determine the changes in the Pāli character within the short periods of twenty and thirty years (*ante*, p. 9) and what I said then fully applies to the cases of the Gupta and the other types. Nowhere have I seen any attempt made to ascertain the extent of difference which arises from the difference in the grain of the stones on which inscriptions have been inscribed.

It is the farthest from my wish to urge that, because, on the authority of the MS. now submitted, I hold that the Bengali character has now had a currency of seven or eight centuries without any material change, the leading groups of the Kuṭiḷa, the Gupta, the Cave, and the Pāli characters must each have had as prolonged a currency. I would say nothing of the kind, for as yet we have not data sufficient to determine that question; but I am convinced that the practice of assigning each of them to one or two centuries is a mistaken and mischievous one, and should be guarded against.

The PRESIDENT then exhibited a specimen of Rock-salt forwarded to the Society by Dr. Aitchison, and made the following remarks on the subject:

In continuation of the collection of rocks noticed in our Proceedings for January, we have received from Dr. J. E. Tierney Aitchison, botanist to the Kuram field-force, "a piece of black or gray coloured rock salt that was collected near the village of Páre-Angúri in Chakmani territory, about 20 miles from Kuram Fort." The specimen was given to him by Mr. Christie, the Political Officer, and there is no mention of the conditions of its occurrence. It may be presumed that the Political officer made a note of whether the mineral was worked, and to what extent, but the information has not been communicated. On the maps the Chakmani country lies at some distance to the west of the fort, and south of the Kuram river. The blackness is only superficial, and is apparently due to the accumulation, in the process of melting, of the particles that give a grey tinge to the salt. This impurity consists of very fine sandy calcareous earth blackened by a small proportion of carbon, but the salt seems to be excellent, and fit for ordinary use as it is. Seeing that on the border of these hills, in Kohát and the Salt-Range, there are two enormous deposits of rock-salt, the latter overlaid by palæozoic rocks and the former overlaid by tertiary strata, there is ample room for conjecture as to the geological position of the Chakmani deposit. There is, however, some ground for surprise at its occurrence there at all, at least if in any quantity, in the fact of the very large trade in salt from Kohát to beyond the Frontier. In the published official account of that trade, a copy of which I have placed on the table, it is represented that Kábul itself is largely supplied with Kohát salt, and that the principal route for the traffic lies up the Kuram valley.

Mr. J. WOOD-MASON exhibited some Butterflies from the Andamans collected by Mr. A. de Roepstorff.

The NATURAL HISTORY SECRETARY also exhibited some butterflies sent from Mussoorie, N. W. Himalayas, by Mr Cecil Templeton. These butterflies consisted of—

A specimen of the female of *Limenitis Danava*, which sex is rarely seen in collections.

A female of *Neptis zaila*, which it is believed has never before been seen.

Two fine specimens of a large species of *Neptis* probably new to science.

The Natural History Secretary also exhibited a new species of butterfly belonging to the family *Morphidæ* from Sibsagar collected by Mr. S. E. Peal.

The name of this new butterfly is *Æmona Peali* closely allied to *Æ. Amathusia*, but differing therefrom in the arched instead of sinuous-concave outer margin of the forewing, and in other points which will be found fully

described in the paper to be published with coloured illustrations in the Journal.

The following papers were read—

1. *Essay on the Sūryaprajñāpti*.—By DR. G. THIBAUT, *Principal, Benares College*.

(Abstract.)

The *Sūryaprajñāpti* is a well-known work on the cosmological and astronomical system of the Jains. But until recently our knowledge of that system was very limited, and founded only on the usual references made to the Jain doctrines by orthodox Hindū writers on Astronomy. The system was principally known as containing the peculiarly strange doctrine of the existence of two suns, two moons and a double set of constellations. In 1878 Prof. A. Weber published a short summary of the *Sūryaprajñāpti*, from which it appeared that the Jain system was not so fantastical as it might have been expected and, at all events, was intimately related to the ordinary system prevalent all over India, before it came under the influence of Greek science. The object of the present Essay is, to submit the *Sūryaprajñāpti* to a renewed, detailed investigation, in order to accurately establish the points of agreement as well as those of difference between the astronomical system of the Jains and the others generally accepted in India.

This paper will be published in the Journal, Part I.

2. *First List of Diurnal Lepidoptera inhabiting the Andamans based upon a collection made during the months of May and June, by MR. A. DE ROEPSTORFF*.—By J. WOOD-MASON, and L. DE NICEVILLE.

This paper will be printed in the Journal, Part II.



## LIBRARY.

The following additions have been made to the Library since the Meeting held in June last.

## TRANSACTIONS, PROCEEDINGS AND JOURNALS,

*presented by the respective Societies and Editors.*

Berlin. K. preussische Akademie der Wissenschaften,—Monatsbericht, July 1879, January and February 1880.

July, 1879. *Pringsheim*.—Ueber Lichtwirkung und Chlorophyll-Function in der Pflanze. *Virchow*.—Beobachtungen des Hrn. J. M. Hildebrandt auf Madagascar. *Olshausen*.—Ueber die Umgestaltung einiger semitischer Ortsnamen bei den Griechen. *Vogel, H. W.*—Ueber die Spectra des Wasserstoffs, Quecksilbers und Stickstoffs. *Kaupert*.—Ueber die Einwirkung des Phosphorpentachlorids auf Senföle und verwandte Körper. Ueber die Methylpyrogallussäure und über die Bildung des Pittakalls. Ueber die volumetrische Äquivalenz von Sauerstoff und Chlor. *Schröder*.—Das Kāthakam und die Mātrāyaṇī Samhitā. *Sybel*.—Zwei Lehrer Friedrich Wilhelms III in der Philosophie. *Martens*.—Übersicht der von Hrn. Peters von 1843 bis 1847 in Mossambique gesammelten Mollusca. *Galle*, und *V. Lasaulx*.—Bericht über den Meteorsteinfall bei Gnadenfrei am 17 Mai 1879.

January, 1880. *Siemens*.—Ueber die Abhängigkeit der Elektrischen Leitungsfähigkeit der Kohle von der Temperatur. *Hofmann*.—Ueber die Einwirkung des Schwefels auf Phenylbenzamid. *Peters*.—Mittheilung über die von Hrn. Dr. F. Hilgendorf in Japan gesammelten Chiropteren. *Webster*.—Ueber zwei Parteischriften zu Gunsten der Maga, resp. Çākadvīpiya Brāhmaṇa. *V. Lingenthal*.—Mittheilung über eine Handschrift. *Goldstein*.—Ueber die Entladung der Elektrizität in verdünnten Gasen. Ueber elektrische Lichterscheinungen in Gasen.

February, 1880. *Kronecker*.—Ueber die Irreductibilität von Gleichungen. *Peters*. Ueber eine neue Art der Nagergattung *Anomalurus* von Zanzibar. *Oppolzer, Th. von*.—Ueber die Sonnenfinsternisse des Schuking. *Bernstein*.—Ueber den zeitlichen Verlauf der elektrotonischen Ströme des Nerven. *Vögel, H. W.*—Ueber die neuen Wasserstofflinien, die Spectra der weissen Fixsterne und die Dissociation des Calciums. *Quincke*.—Ueber elektrische Ausdehnung. *Hildebrandt*.—Die Berginsol Nosi-Komba und das Flussgebiet des Semberano auf Madagascar. *Peters*.—Mittheilung über neue oder weniger bekannte Amphibien des Berliner Zoologischen Museums. *Rammelsberg*.—Ueber molekulare Erscheinungen am Zinn und Zink.

Bombay. The Indian Antiquary,—Vol. IX, Parts 97 and 98, June and July 1880.

June. *Beal, Rev. S.*—The Sūtra called Ngan-shih-Niu, i. e., Silver-White Woman. Succession of Buddhist Patriarchs. *Walhouse, M. J.*—Archæological Notes. *Bhagvānlāl Indrajī*.—The Saiva Parikramā. *Sandford, W.*—Account of Excavations made near Manikyala, in the Panjab. *Jacobi, Dr. H.*—

On Mahāvira and his Predecessors. *Bhagvānīdī Indrājī*, and *Bühler, Dr. G.*—Inscriptions from Nepal.

Bordeaux. Société de Géographie Commerciale,—Bulletin, Nos. 10 and 11.

Boston. Society of Natural History,—Memoirs, Vol. III, Part 1, Nos. 1 and 2.

No. 1. *Minot, C. S.*—On *Distomum Crassicolle*: with brief notes on Huxley's proposed classification of worms.

No. 2. *Scudder, S. H.*—The Early Types of Insects: or the origin and sequence of insect life in palæozoic times.

—: —. Proceedings,—Vol. XIX, Parts 3 and 4; Vol. XX, Part 1.

Part 3. *Scudder, S. H.*—An Insect Wing of Extreme Simplicity from the Coal Formation. *Morse, E. S.*—Remarks on *Lingula*, and Japanese Pottery. *Scudder, S. H.*—*Rachura*, a new Genus of Fossil Crustacea.

Part 4. *Scudder, S. H.*—Note on Dimorphism in Acrydians. *Wilder, Prof. B. G.*—Aëreal Respiration in the Mud Fish. An apparatus to illustrate the action of the Diaphragm in Respiration.

No. 1. *Hagen, Dr. H. A.*—Museum Pests observed in Cambridge. Larvæ of Insects discharged through the Urethra. *Parker, A. T.*—Experiments on Spontaneous Generation.

Calcutta. Geological Survey of India,—Memoirs, Vol. XV, Part 2.

*Griesbach.*—Geology of the Ramkola and Tatapani Coal-Fields.

—: —. Palæontologia Indica,—Series X, Indian Tertiary and Post-Tertiary Vertebrata, Vol. I, Parts 4 and 5.

Part 4. *Lydekker, R.*—Supplement to Crania of Ruminants.

Part 5. *Lydekker, R.*—Siwalik and Narbada Proboscidea.

Series XIII. Salt Range Fossils: by Dr. W. Waagen.

1. Productus-Limestone Fossils. 2. Pisces—Cephalopoda: Supplement. Gasteropoda.

—: —. Mahābhārata,—No. 47.

Genoa. Museo Civico di Storia Naturale,—Annali, Vols. IX—XIV.

Vol. IX. *Pavesi, J.*—Studi anatomici sopra alcuni uccelli. *Thorell, T.*—Descrizione di alcune specie di Opilioni dell' Arcipelago Malese appartenenti al Museo Civico di Genova. *Sharp, D.*—Description of a new species, indicating a new genus, of Coleoptera. *Chapuis, F.*—Cryptocéphalides inédits du Musée Civique de Gènes. *Gestro, R.*—Aliquot Buprestidarum novarum diagnoscens. Descrizione di una nuova specie del genere curis, della famiglia dei Buprestidi.

Vol. X. *Harold, E. de.*—Énumération des Lamellicornes Coprophages rapportés de l' Archipel Malais, de la Nouvelle Guinée et de l' Australie boréale par M. M. J. Doria, O. Beccari, et L. M. D'Albertis. *Thorell, T.*—Studi sui ragni malesi e papuani. I. Ragni di Selobes raccolti nel 1874 dal Dott. O. Beccari. *Gestro, R.*—Descrizioni di alcuni Coleotteri e diagnosi di quattro specie nuove esistenti nel Museo Civico di Genova.

Vol. XI. Crociera del Violante comandato dal Capitano-Armatore Enrico d' Albertis durante l'anno 1876.

Vol. XII. *Rondani, C.*—Hippoboscita exotica non vel minus cognita. *Pavesi, F.*—Seconda contribuzione alla Morfologia e sistematica dei Selachi. *Dubro-*

ny, A.—Essai sur le genre *Chelidura*. Bellonci, G.—Morfologia del sistema nervoso centrale della *Squilla mantis*. Issel, A.—Appunti paleontologici.—III Ritrovamento del genere *Machaerodus* sugli Appennini Liguri.

Vol. XIV. Issel, A.—Appunti paleontologici. IV. Descrizione di due denti d'Elefante, raccolti nella Liguria occidentale. Salvadori, T.—Catalogo di una collezione di uccelli fatta nella parte occidentale di Sumatra dal Prof. Odoardo Beccari. Dubrony, A.—Énumération des Orthoptères rapportés par M. M. J. Doria, O. Beccari, et L. M. d'Albertis des régions Indienne et Austro-Malaise. Vinciguerra, D.—Appunti ittologici sulle collezioni del Museo Civico di Genova. I. Enumerazione d'alcune specie di pesci raccolti in Sumatra dal Dott. O. Beccari nell'anno 1878 Oberthur, R.—Notes sur quelques Coléoptères récoltés aux îles Sanghir par les chasseurs de M. A. A. Bruijn et description de trois espèces nouvelles.

London. Academy,—Nos. 420—422. .

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Keane, A. H.—On the Relations of the Indo-Chinese and Inter-Oceanic Races and Languages. Fule, Col.—Notes on Analogies of Manners between the Indo-Chinese Races and the Races of the Indian Archipelago. Westropp, H. M.—Notes on Fetichism.

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Hall, Prof. A.—Observations of the Satellites of Mars. Gledhill, J.—Phenomena of Jupiter's Satellites, observed at Mr. E. Crossley's Observatory, Barmerside, Halifax.

———. Athenæum,—Nos. 2713—2716.

———. Royal Geographical Society,—Proceedings, Vol. II, Nos. 4 and 5, April and May 1880.

No. 4. Progress of the East African Expedition; Mr. Thomson's Report on his Journey from Lake Nyassa to Lake Tanganyika. Biddulph, Major-Gen. Sir M. A.—Pishin and the Routes between India and Candahar.

No. 5. Temple, Lieut. G. T.—Voyage on the Coasts of Norway and Lapland. Hutchinson, E.—Ascent of the River Binué in August 1879; with remarks on the systems of the Shary and Binué. Thomson, J.—Progress of the Society's East African Expedition: Journey along the Western side of Lake Tanganyika. .

———. Royal Microscopical Society,—Journal, Vol. III, No. 2, April 1880.

Nacht, A.—On a Petrographical Microscope. Record of Current Researches relating to Invertebrata, Cryptogamia, Microscopy, &c.

———. Nature,—Vol. XXII, Nos. 551—554.

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- idées cosmogoniques de Kant, à propos d'une réclamation de priorité de M. Schlützel. *Grimaux, E. and Adam, P.*—Synthèse de l'acide citrique. *Béchamp, A.*—Recherches sur les matières albuminoïdes du cristallin au point de vue de la non-identité de celles qui sont solubles avec l'albumine du blanc d'œuf et du sérum. *Novi, G.*—Sur l'emploi des sables volcaniques dans la traitement des vignes attaquées par le *Phylloxera*. Un rapide aperçu des matières contenues dans l'Ouvrage de M. Alph. de Candolle, intitulé : "La Phyto-graphie, ou l'art de décrire les végétaux." *Radau, R.*—Sur les réfractions des Bessel. *Picard, E.*—Sur une extension aux fonctions de deux variables du problème de Riemann relatif aux fonctions hypergéométriques. *Mathieu, E.*—Sur l'équilibre d'élasticité d'un prisme rectangle. *Ader.*—Téléphone à surexcitation magnétique. *Maccé, J. and Nicati, W.*—Etude de la distribution de la lumière dans le spectre. *Levy, C. J. A.*—Sur l'astigmatisme. *Loguigrine, W.*—Chaleur dégagée dans la combustion de quelques alcools isomères de la série grasse ainsi que l'œnanthol. *Ditte, A.*—Sur les mélanges réfrigérants formés de deux sels cristallisés. *Kessler.*—Hydrate hydrofluosilicique cristallisé. *Marangoni, C.*—Fonctions de la vessie natatoire des Poissons. *Gérard, R.*—Recherches sur la structure de l'axe au-dessous des feuilles séminales chez les Dicotylédones. *Magitot, E.*—De la structure et du développement du tissu dentinaire dans la série animale. *Herrmann, G. and Desfosses, L.*—Sur la muqueuse de la région cloacale du rectum. *Berlioux.* Sur le voyage d'exploration de M. Rohlfs dans le Sahara oriental.

Paris. Revue Critique,—Vol. IX, Nos. 20—22.

———. Revue des deux Mondes,—Vol. XXXIX, Nos. 2 and 3.

———. Journal des Savants,—May 1880.

- Franck, A.*—Histoire de de la philosophie de Franco. *Egger, E.*—La poésie de Pindare et les lois du lyrisme grec. *Quatrefages, A. de.*—Les crânes finnois. *Gruyer, A.*—Le Jeu de violon, par Raphaël. *Esmein, A.*—Un traité de droit syro-romain au cinquième siècle.

— . Revue Scientifique,—Vol. XVIII, Nos. 47—50.

- No. 49. Paris.—Les Extincteurs. *Huxley, Prof. Th.*—Organes des sens et fonctions de reproduction de l'écrivisse. *Dastre.*—Vie et travaux de Glisson d'après M. Marion. *Legoyt.*—Statistique du suicide.

No. 50. *Moutier, J.*—La loi de Dulong et Petit. *Tollin, H.*—Michel Servet.

### BOOKS PURCHASED.

- BELT, THOS. The Naturalist in Nicaragua. 8vo., London, 1874.  
 DAVIDS, T. W. RHY. (Non-Christian Religious Systems.) Buddhism : Being a Sketch of the Life and Teachings of Gautama, the Buddha. 12mo., London, 1878.  
 DOUGLAS, PROF. R. K. (Non-Christian Religious Systems.) Confucianism and Taouism. 12mo., London, 1879.  
 Entomologist's Monthly Magazine. Vols. I—XIII. 8vo., London, 1864-77.  
 FERGUSSON, J. History of Indian and Eastern Architecture. 8vo., London, 1876.

- GOLDSTÜCKER, PROF., *Literary Remains of the late.* 2 Vols. 8vo., London, 1879.
- HÛ, FERDINAND. *Le Dhammapada, avec Introduction et Notes, suivi du Sutra en 42 Articles, traduit du Thibétain; avec Introduction et Notes par Léon Feer.* 12mo., Paris, 1878.
- KIELHOORN, DR. F. *The Vyākaraṇa-Mahābhāṣya of Patanjali.* Vol. I, Part 3. 8vo., Bombay, 1880.
- LANGEREAU, E. *Pantchatantra ou les cinq livres, recueil d'apologues et de contes, traduit du Sanscrit.* 11. 8vo., Paris, 1871.
- NEWCOMB, SIMON. *Astronomical Papers prepared for the use of the American Ephemeris and Nautical Almanac.* Vol. I, Part 1. *Tables of Eclipses.* 4to., Washington, 1879.
- PAVIE, THEODORE. *Krishna et sa doctrine. Traduit sur le manuscrit Hindoui de Lalatch Kab.*
- REGNAUD, P. *Le Chariot de Terre cuite (Mricchakatika), drame Sanscrit attribué au roi Cûdraka, traduit et annoté des scolies inédites de Lallâ Dikshita.* 4 Vols. 12mo., Paris, 1876-77.
- REGNAUD, P. *Les stances érotiques morales et religieuses de Bhartrihari, traduites du Sanscrit.* 12mo., Paris, 1875.
- RODET, LÉON. *Leçons de Calcul d' Aryabhata.* 8vo., Paris, 1879.
- WEBER, DR. A. *Die Handschriften, Verzeichnisse der Königlichen Bibliothek.* Vol. I. *Verzeichniss der Sanskrit Handschriften.* 4to., Berlin, 1853.
- WEBER, A. *Indische Streifen.* Vol. III. 8vo., Leipzig, 1879.
- WILLIAMS, PROF. MONIER. *(Non-Christian Religious Systems.) Hinduism.* 12mo., London, 1878.
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[APPENDIX.]

ABSTRACT STATEMENT  
OF  
RECEIPTS AND DISBURSEMENTS  
OF THE  
ASIATIC SOCIETY OF BENGAL  
FOR  
THE YEAR 1879.

# STATEMENT, NO. 1.

## Abstract of the Cash Account of the Asiatic Society, 1879.

	For detail see		For detail see
Balance from last account.....Ra.	7,216 10 6		
Balance of Admission Fee Fund, brought forward	164 13 7		
<b>To Revenue as follows:—</b>			
Admission Fees.....	1,104 0 0	By Expenditure as follows:—	
Subscriptions.....	7,421 13 0	Publications.....Ra.	6,588 10 4
Communications.....	190 0 0	Library.....	1,608 5 1
Sale of Publications.....	1,528 5 6	Coins.....	403 1 0
Interest on investment.....	3,264 4 0	Establishment.....	3,933 10 6
Miscellaneous.....	250 5 6	Building and Furniture.....	549 15 0
Conversazione.....	267 12 0	Taxes.....	852 0 0
		Charges on investment.....	12 4 10
		Contingencies.....	1,145 13 8
		Postage.....	422 15 6
		Conversazione.....	288 15 8
Advances.....	14,026 8 0		15,805 11 7
Petty Stamp Account.....	431 6 6	Advances.....	537 1 1
	394 12 0	Petty Stamp Account.....	412 5 0
<b>Various Funds as follows:—</b>		Investment, Society's Fund.....	2,344 0 0
Kurz Memorial.....	50 8 0	" Piddington Fund.....	400 0 0
Blochmann Memorial.....	947 0 0		2,744 0 0
Piddington Pension.....	370 10 5	<b>Various Funds as follows:—</b>	
	1,368 2 5	Stoliczka Memorial.....	273 7 0
		Oldham Memorial.....	153 1 6
		Kurz Memorial.....	50 8 0
		Blochmann Memorial.....	8 13 6
			485 14 0
		Balance Cash.....	19,984 15 3
		" Bank of Bengal, account	39 12 2
		No. 1.....	3,570 1 4
		" Ditto, account No. 2.....	7 7 10
			3,617 5 4
		Total, Ra. 23,602 5 0	Total, Ra. 23,602 5 0

Agreed with the recorded accounts.

J. WESTLAND.  
J. C. DOWGLAS.

# Statement of Detail of Receipts and Charges.

a	Sale of godown and old bricks.....	Ra.	140	0	0	Lithographing and Engraving Charges.....	Ra.	1,321	0	4
	Fines, &c.....		22	2	3	Printing Charges.....		4,987	2	9
	Recovery of charges on account Oldham Memorial.....		87	12	9	Paper for Plates.....		84	14	6
	Recovery of price of Coins.....		0	6	6	A. Grote, Esq., for publication charges of Mr. Moore's Papers on Lepidoptera, £5-6-8.....		76	7	6
b			250	5	6	Freight for sending Journal and Proceedings to England.....		72	4	6
	Subscription for Kurz Memorial.....		50	8	0	Overland Carriage on Lithographed Plates from England.....		46	12	9
c			947	0	0			6,688	10	4
	Subscription for Blochmann Memorial.....		29	4	0	f	Subscription to the "Calcutta Review".....	24	0	0
d	Interest on Securities.....		2	10	8		Ditto to the "Medical Gazette".....	15	0	0
	Excess received on investment.....		65	4	9		Ditto to "Stray Feathers".....	11	0	0
	Unexpended balance of Oldham Memorial.....		273	7	0		Ditto to "Bengal Directory".....	14	0	0
	Ditto ditto of Stoliezka Memorial.....		370	10	5		Ditto to "Vedarthayatra".....	6	6	0
							Purchase of Books, through Messrs. Trübner & Co. Ditto through Mr. E. Leroux.....	372	14	6
e							Ditto through Messrs. Friedlander & Sohn.....	31	2	6
							Ditto through H. Georg, Bale.....	116	10	6
							Ditto through Capt. Legge.....	12	12	10
							Ditto through Messrs. Higginbotham and Co.....	48	7	3
							Ditto in Calcutta.....	53	4	0
							Book-binding charges.....	466	9	6
								436	2	0
								1,608	5	1
g						g	Establishment.....	3,328	0	0
							Pension to Islam Khan.....	36	0	0
							Salary for Cataloguing Mr. Hodgson's Nepalese Sanskrit MSS.....	127	11	9
							Ditto for copying Manuscripts.....	26	15	0
							Ditto of Punkah bearer.....	114	15	9
								3,933	10	6

# Statement of Detail of Receipts and Charges.—(Continued.)

<i>h</i>	Repairing the boundary wall.....Ra.	270 0 0
	Repairing and changing Architrave in Staircase.....	148 0 0
	Repairing the Privy-room.....	20 8 0
	Repairing and supplying canes for the matting up-stairs.....	18 0 0
	Repairing Glass Cases.....	93 7 0
		549 15 0
<i>k</i>	Police and Lighting rates.....	204 0 0
	House rate.....	468 0 0
	Water rate.....	180 0 0
		852 0 0
<i>l</i>	Difference on purchase (see <i>p.</i> ).....	17 5 9
	Banking charge on drawing interest.....	7 15 1
	Renewing fee.....	1 0 0
		26 4 10
	Deduct received in December.....	14 0 0
		12 4 10
<i>m</i>	Commission on Subscriptions collected.....	40 13 6
	Meeting charges.....	167 6 9
	Advertising charges.....	48 13 0
	Printing charges.....	309 8 0
	Fee for Stamping Cheques.....	3 2 0
	Stationery.....	248 13 0
	Binding Letter Files.....	15 6 0
	2 Carbon portraits of Hon'ble E. C. Bayley and Major-Genl. H. L. Thulier.....	70 0 0
	Packing charges.....	17 12 6

Landing charges.....	16 7 9
Petty charges.....	207 11 2
	<u>1,145 13 8</u>
<i>n</i> For refreshments, &c.....	196 14 0
Printing charges.....	12 0 0
Cart, cooley and conveyance.....	80 1 8
	<u>288 15 8</u>
<i>p</i> March. Purchased 1,200 $4\frac{1}{2}$ per cent., paid.....	1,195 6 1
May. Purchased 500 $4\frac{1}{2}$ per cent., paid.....	490 2 7
Dec. Purchased 700 $4\frac{1}{2}$ per cent., paid.....	675 13 1
	<u>2,361 5 9</u>
Brought to account as follows:—	
• 1,700 $4\frac{1}{2}$ per cent. @ 100.....	1,700 0 0
700 $4\frac{1}{2}$ per cent. @ 92.....	<u>644 0 0</u>
Difference taken on charges on investment.....	2,344 0 0
	<u>17 5 9</u>
<i>q</i> March. Purchased 400 $4\frac{1}{2}$ per cent., paid.....	397 5 4
Brought to account as follows:—	
400 $4\frac{1}{2}$ per cent. @ 100.....	400 0 0
On receipt side (see <i>d</i> ).....	<u>2 10 8</u>
<i>r</i> Unexpended balance transferred to Pension Fund...	273 7 0
<i>s</i> Repaid to Society (see <i>a</i> ).....	87 12 9
Unexpended balance transferred to Pension Fund...	<u>65 4 9</u>
	153 1 6
<i>t</i> Cost of enlarged portrait of Mr. Kurz.....	50 8 0
<i>u</i> Printing charges and Postage.....	<u>8 13 6</u>

H.

*The following is the "State" of the Society upon 31st December, 1879.*

ASSETS.		LIABILITIES.	
Personal account.....	Ra. 4,744 3 4	Personal account.....	Ra. 119 7 11
Cash.....	3,617 5 4	Servants' Pension Fund.....	1,007 11 4
Invested Funds.....	1,37,468 0 0	Blochmann Memorial Fund.....	1,268 4 6
		Balance.....	2,395 7 9
			1,43,434 0 11
	Total, Ra. 1,45,829 8 8		Total, Ra. 1,45,829 8 8

The Detail of Cash is as follows:—

In hand, as per Cash Book.....	Rs.	39	12	2
In Bank, account No. 1.....		3,570	1	4
"    account No. 2.....		7	7	10
	Rs.	36	17	5

Accounts Nos. 1 and 2 will henceforth be amalgamated.

**The detail of the invested balance is as follows :—**

Society's, 4 per cent. of 1879, 5,700 @ 92.....Rs.	5,244	0	0
4 per cent. of 1865, 4,000 }			
4 per cent. of 1842-43, 700 } @ 92.....	4,324	0	0
4½ per cent. of 1878-79, 1,27,900 @ 100...	1,27,900	0	0
	<hr/>	1,37,468	0

**J. WESTLAND.**  
**J. C. DOUGLAS.**

# STATEMENT, NO. 3.

## Abstract of the Cash Account of the O. P. Fund for 1879.

Balance from last account.....	Ra. 3,848	3	0	By Expenditure as follows:—			
				Publications—			
To Revenue as follows:—				Sāna Veda Saṁhitā.....	Ra. 464	14	3
Government grant.....	9,000	0	0	Akbar Namaḥ.....	1,128	2	0
Sales.....	3,002	6	7	Prithirāj Rāsu.....	286	0	0
Miscellaneous.....	12	0	0	Gobhiliyā Gṛhiyā Sūtra.....	877	0	0
Advances.....	94	6	0	Chaturvarga Chintāmani.....	1,674	8	6
Petty Stamp account.....	154	3	0	Yayū Purāna.....	1,059	0	0
				Agni Purāna.....	184	13	0
				Taittirīya Saṁhitā.....	648	3	0
				Tabaqat-i-Nagiri.....	1,443	1	8
				Mimāṁsā Darśana.....	225	2	0
				Bhāmati.....	171	13	6
				Establishment.....	8,012	9	11
				Catalogue.....	1,176	0	0
				Miscellaneous.....	480	0	0
				Advances.....	190	5	6 a
				Petty Stamp Account.....	134	6	3
				Postage.....	184	3	6
					116	3	6
				Balance Cash.....	10,293	12	8
				" Bank of Bengal.....	79	4	1
					5,738	1	10
					5,817	5	11
					Total, Ra. 16,111	2	7

Agreed with the recorded accounts.

J. WESTLAND.  
J. C. DOUGLAS.

## The Detail Statement of charges for O. P. Fund for 1879.

a Advertising charges.....	Ra. 130	0	0
Freight for sending books to England.....	35	8	0
Commission on collecting bills.....	1	8	6
Book-binding charges.....	18	6	0
Fee for Stamping Cheques.....	3	2	0
Petty charges.....	1	13	0
	Ra. 190	5	6

## STATEMENT, NO. 4.

*Assets and Liabilities of the Asiatic Society, O. P. Fund, on 1st January, 1880.*

ASSETS.		LIABILITIES.	
Personal account.....	Rs. 1,164 5 11	Personal account.	
Cash, and Bank.....	5,817 5 11	Dr. Muir's.....	Rs. 898 10 0
		" Government, N. W. P.....	1,040 0 0
		" Miscellaneous.....	38 4 0
		Balance.....	1,976 14 0
			5,004 13 10
		Total, Rs.	6,981 11 10
		J. WESTLAND.	
		J. C. DOUGLAS.	

*Abstract of the Cash Account Conservation of Sanskrit MSS. Fund for 1879.*

*The Detail Statement of charges for Conservation of Sanskrit MSS. Fund for 1879.*

ASSETS		LIABILITIES	
Cash.....	Rs 1,539 14 8	Balance.....	Rs. 2,339 14 8
Advanced to Dr. R. Mitra.....	600 0 0		
"    " N. Mookerjee.....	200 0 0		
	Rs 2,339 14 8		Rs. 2,339 14 8.

J. WESTLAND.  
J. C. DOUGLAS.

J. WESTLAND.  
J. C. DOVELAS.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
FOR AUGUST, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 4th August, at 9.15 P. M.

H. B. MEDLICOTT, Esq., F. R. S., in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the authors,—(1) Valuations of coins which are now, or have recently been current, by Col. J. F. Tennant, (2) The Indian Swastika and its Western Counterparts, by E. Thomas, (3) Results of Meteorological Observations, 1879, at G. V. Juggarow's Observatory, Daba Gardens, Vizagapatam, by A. V. Nursingrow, and (4) Lytttoniana, Vol. I, by Adharlal Sen.

2. From the Batavian Observatory,—Rainfall in the East Indian Archipelago, first year, 1879, by Dr. P. A. Bergsma.

3. From P. W. Sheaffer, Esq.,—Diagram of the Progress of the Anthracite Coal Trade of Pennsylvania, with statistical tables &c.

4. From the Government of the Netherlands,—*Bôrô-Boudour dans l'île de Java*, by F. C. Wilsen and J. F. G. Brumund.

5. From the Bengal Secretariat,—The Flora of British India, Vol. II by Sir J. D. Hooker.

6. From the Marine Survey Department—Chart of Port Mouat in South Andaman Island.

The following Gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

Pandit Mohunlall Vishnulall Pandia.

The Hon. J. Gibbs, C. S. I.

Raja Siva Prasad, C. S. I.

J. A. Brown, Esq., C. S.

W. Lambe, Esq., C. S.

H. W. W. Reynolds, Esq., C. S.

The following Gentlemen are candidates for election, and will be balloted for at the next meeting of the Council.

1. Richardson Walter Nicholson, Esq., Ghazipur, proposed by H. Rivett-Carnac, Esq., seconded by Alex. Pedler, Esq.

2. Lieut.-Col. M. G. Clerk, Benares, proposed by H. Rivett-Carnac, Esq., seconded by Alex. Pedler, Esq.

3. Babu Benod Behary Mullick, proposed by Babu Protapa Chundra Ghosha, seconded by Dr. R. L. Mitra.

4. Babu Sib Chunder Nag, Personal Assistant to the Commissioner of Chittagong, proposed by Babu Adharlal Sen, seconded by Babu Umesh Chunder Dutt.

5. Khalif M. Hussan, proposed by Moulvie Kabiruddin Ahmad, seconded by Alex. Pedler, Esq.

The PRESIDENT announced that, in accordance with Rules 37 and 38 of the Society's Bye-Laws, the names of the following Gentlemen had been posted up, as Defaulting Members, since the last Monthly General Meeting, and would now be removed from the List of Members, and published in the Proceedings.

J. F. Baness, Esq.

W. Porter, Esq.

P. Dejoux, Esq.

J. S. Gunn, Esq., M. B.

The COUNCIL announced that Dr. T. R. Lewis had tendered his resignation as Member of the Council and Trustee of the Indian Museum, and that Mr. H. F. Blanford had been re-elected Member of Council.

The SECRETARY announced that H. E. the Viceroy LORD RIPON had consented to accept the office of Patron of the Society.

Dr. A. F. RUDOLF HOERNLE exhibited some photographs of groups of Aryans and non-Aryans from the so-called "neutral zone" on the North Western frontiers of India, sent by Dr. G. W. Leitner, Principal of the Government College at Lahore. The photographs were taken at Lahore, and represent men from Hanza, Nagyr, Chitral, Gilgit, Kolab, Gabrial and Badakhshan.

Dr. RA'JENDRALA'LA MITRA exhibited a facsimile of a Chinese inscription forwarded to him by Mr. Barton, Magistrate and Collector of Gayá. The stone which bore the record was found by Mr. Beglar in one of the rubbish mounds around the great temple at Buddha-Gayá at a depth

of about 12 feet from the top of the mound. It had evidently been set up by a Chinese pilgrim, very much in the same way in which the Burmese inscriptions have found their way to the place. Dr. Mitra had sought the aid of some Chinamen of Cossitollah to decypher the monument, but had failed, the interpretation given him being of a character which could not be verified by him. He had been told that the record was a thousand years old. If so, it would be of the time of Hiouen Tshang; but it may be older still, and may be the identical stone which Fa Hian is said to have set up at Buddha-Gayá. Dr. Mitra intends to send the facsimile to the Rev. S. Beal, London, to be decyphered.

Dr. MITRA also submitted the following notes on two copper-plate inscriptions found in Sylhet and forwarded to him by Mr. Luttmann-Johnson.

I am indebted to Mr Luttmann-Johnson, Deputy Commissioner of Sylhet, for facsimiles, in duplicate, of two copper-plate grants, which had been discovered several years ago, but lately brought to notice by Paṇḍit Śrīnīvāsa Śāstrī, brother of the renowned Sanskrit scholar and poet, Itamā Bāī. Bābu Rājānārāyaṇa Deva Chaudhuri, in whose estate they were discovered, says "they were found about 15 years ago, in a tillah in Bhātārā, and dug up from a depth of about 8 feet, in the course of removing old bricks from the foundation of an ancient building." The tillah stands by the highway, at a distance of a mile to the south-west of a market called Bhātārā bazar, and close by a hill also named Bhātārā. Some call it Nao-lar tillah, others, Iṭer tillah (brick mound). According to tradition the tillah is the palace which belonged to Rāja Gauragovinda *alias* Govinda Siṅha. He was a prince of great renown, and much devoted to Vedic rites. A tillah at a short distance is shown in the centre of which he used to perform the homa rite, in a large square vat lined with bricks. This is called Homer Tillah. Close by, there is a place which bears the name of Dakṣiṇā Kāṇḍa, and this is said to be the place where he distributed alms, after performing the rite. A large tank in the neighbourhood is also attributed to him. The prince was overthrown by Shāh Jellāl, *alias* Jelāl-uddīn Khāny, who, following the footsteps of his predecessor Mulk Yuzbek, led his army to the eastern parts of Bengal, invaded Sylhet in 1257 A. D., and brought some of the petty independent rājās under his control. His success, however, was short-lived, for he was suddenly called back to defend Gaur from the invasion of Irsilān Khān, and soon after killed in battle. Bābu Jagachchandra Deva Chaudhuri gives the following details of the discovery: "When in 1279 (B. S.) one of my tenants, named Shaikh Kātāi, was engaged in digging out bricks from this tillah, he found two copper-plates with letters engraved on them. These were taken by my brother Kāśichandra Rai Chaudhuri (now deceased), and

were with us for years together, until about two years ago Maulavi Hámid Bakht Majumdár took them from me. The Maulavi made them over to the Deputy Commissioner in whose office they are now preserved."

Each grant is inscribed on two quadrangular plates of copper, having a projection, on the top of which a hole was intended to be bored, but this was not done. One set is much larger than the other, the former measuring  $12\frac{1}{2} \times 11$  inches, and the latter  $8 \times 6\frac{1}{2}$  inches.

The larger set has 27 lines of inscription on the first plate and 28 on the second. The small one 16 lines on each plate. The letters on the two are of the same type, a cross between the Kuṭila and the Bengali, and, on the whole, in a fair state of preservation.

No. I opens with a salutation to Siva, and then gives a genealogy of four kings who are said to have belonged to the race of the moon. The founder of the line was Navagirváṇa, in whose favour the panygerist has nothing to say beyond his having been the issue of prosperity personified. His son Gokula Deva claims distinction for being the grandfather of the reigning king. His son was Náráyaṇa, and from him descended Govinda *alias* Keśava, who granted, for the adoration of a lingam of the name of Vaṭeśvara, whose temple stood in Haṭṭapáṭaka (the great fair), probably the Bhátará bazar of the present day, lands to the extent of 375 plough measures, 296 houses, and a great number of slaves. One of the epithets used for Siva is *Srihaṭṭeśvara*, or the lord of Sylhet.

The lands and houses given were scattered in different villages, and their names as also the extent of land in each village, are given in detail, but from want of local knowledge I am not in a position to identify them.

The most remarkable peculiarity in the record is the use of the word *hala* "a plough" for indicating a measure of land. I do not remember to have noticed it in any other land-grant that I have seen. In old Smritis it is, however, often referred to. Thus in Manu, (VII, 119), "Let the lord of ten towns enjoy the produce of two plough-lands; the lord of twenty, that of ten plough-lands; the lord of a hundred, that of a village or small town; the lord of a thousand, that of a large town." The word used is *kula*, which in ordinary Sanskrit means a herd, but the commentator Kulluka Bhaṭṭa explains the term by the words "as much ground as can be tilled with two ploughs each drawn by six bullocks."\*

This technical meaning is recognized by Háríta, who says, "the *hala* (plough) drawn by eight bullocks is the most virtuous, (*dharmahala*, i. e., the best); that of six bullocks belongs to men of consequence; that of four for ordinary householders; and that of two for Bráhmaṇicides (for whom bare subsistence is all that is needed)."

\* तथाविधचलद्वयेन यावन्ती भूमिर्वाह्यते तत् कुलमिति वदति ।

† अष्टागवं चर्षादलं यद्गवं जीवितार्थिनां ।

चतुर्गवं सवस्त्रानां द्विगवं ब्रह्मघातिनाम् ॥

In the Smṛiti of Parásara the verse occurs with slight variations, changing "householders" into wicked men, and "Bráhmanicides" into tauricides.\*

I have failed to find out the exact area of the land the term indicated. But looking to the original meaning of the word *kula* I am disposed to think that it is closely related to the Anglo-Saxon *hyde* and its Latin congener *hida* or *hyda*, with its various corruptions in most of the modern languages of Europe. It originally meant *as much land as could be tilled with one plough*, and was thus equal to a *kula* of Manu and a *hala* of Háríta, though subsequently it came to mean a *family possession*, and has been differently estimated by different authors from 60 to 120 acres. Hume has a passage quoted from Spelman, which reads very like a paraphrase of Manu's verse, it runs thus: "Four hydes made one knight's fee, the relief of a barony was twelve times greater than that of a knight's fee," (*History of England*, II, p. 116.) I have nowhere seen any attempt made to account for the use of the word hyde meaning *cutis*, to indicate a plough; I fancy it is a metonymy for a bullock which stands for a plough. This idea, however, had been long ago forgotten, for even in the Greek story of Dido, when she asked for a hide of land, she was understood to mean as much land as could be covered by a hide, and she cut up the hide into thongs to cover a large area to found the city of Byrsa: no idea of a plough or bullock was then entertained. It may be conjectured that a bag made of an entire hide was naturally a hide, and as much land as could be cultivated by seed contained in that bag was also called a hide; but there is no proof of any kind to support it, and it must therefore be rejected as unwarrantable. Anyhow there is sufficient similitude between *hala* and *hide* to suggest the idea of a common origin.

The date of the record has been read by Paṇḍit Śrínivása Śāstrī, to be the year 2928 of the era of the first Paṇḍava king: पाण्डवकुलादिपञ्चाब्द सं २९२८. But in the original the first figure is very unlike the third, and has been moreover scratched over, and is abundantly doubtful. The second is also open to question. I am disposed to take the first for a 4, and the second for 3, which would make the date equal 4328 = A. D. 1245, or about the time when Sháh Jellál invaded Sylhet. That the Govinda of the Tillah is the same with that of the record I have no reason to doubt.

No. II is a Vaishṇavite record. It opens with a salutation to Náráyaṇa, the husband of Kamalá; and gives a list of four kings, who belonged to the lunar race. The first was Gokula, who is said to have been as munificent as the *kalpa* tree. His son was Náráyaṇa, who was followed by

\* इलमहगवं धर्मं वदगवं मध्यमं कुरुत ।

चतुर्गवे द्दशसामां द्विगवं दृषधानिनाम् ॥

Keśava Deva, who dedicated a temple to the destroyer of Kañśa, and performed the rite of weighing himself against gold, silver and other articles which he presented to Bráhmans. His son was Íśána Deva. He erected a lofty temple for the enemy of Madhukaitabha, a form of Viṣṇu, and, by the advice of his minister Vanamálí Kara, a Vaidya by caste, and the concurrence of his commander-in-chief Viradatta, presented two ploughs of land for its support. The deed was engraved by one Mádhava of the Dása tribe, on the 1st of Vaiśákha in the year 17. The word used for the year is २०, which is an abbreviation of Samvat, a word ordinarily used for the era of Vikramáditya, but not unoften also for any era, and here it is obviously intended for the era of the king's reign.

It is obvious that the first prince of this plate is the same with the second of the first plate, the next two are likewise the same, for there is no reason to doubt that Keśava of the second plate is the *alias* of the Govinda of the first grant, and the new name Íśána Deva, is the fifth from Navagírvána. The genealogy will accordingly stand thus—

1. Navagírvána *alias* Kharavána.
2. Gokula.
3. Náráyana.
4. Keśava *alias* Govinda.
5. Íśána.

These rájás were sovereigns of Káčhúr, and professed to be of the dynasty of Ghaṭotkacha, son of Bhíma, one of the Pándu brothers, by Hidimbá, the daughter of an aboriginal cannibal chief. It is extremely doubtful, however, if the Pándus ever came so far to the East.

If the date assigned to the first plate be accepted, the second will be a little over 17 years after it, or in the last quarter of the 13th century.

#### *Translation of Inscription, No. I.*

Om ! Salutation to Śiva. Salutation be unto him, who is the lord of the three worlds, by whose body, represented by the earth,\* is this universe upheld, who is known as the supreme lord, and as one who, though verily one alone, has the threefold names of Brahmá, Upendra, (Viṣṇu) and Maheśa, and as the receptacle of the three qualities, the leader of creation.

2. 'He prospers—he the crown-jewel on the head of the destroyer of Tripura, the silver pitcher for the bath of the mistress of Cupid, the whetstone for sharpening the arrows of the flowery-bowed god, the cool-rayed ornament of night.†

\* The body of Śiva is described to represent the earth, water &c., in eight forms.  
 चञ्चलं चित्तिरूपायै नमः &c.

† Epithets for the moon.

3. In his race were born many valorous kings whose eulogiums are extant on the land of Bharata.

4. Now was born the noblest of kings Navagīrvāna,\* (the new god,) of fierce arrow, (*kharavāna*) of great renown, the issue of the goddess of royal prosperity.

5. His son, the king of the name of Gokūla Deva, was the grandfather of the (reigning) king. It is wonderful that the sunlight of his glory caused numbness in inimical kings (instead of exciting vivacity as sunlight should).

6. From him descended king Nārāyaṇa, who, like Lakshmi, was churned from the ocean of antagonistic kings, with the Mandāra mountain of valiant arms, and who rivalled the Lord by taking his shelter in enjoyment (nanda).†

7. Of him was born Keśava Deva of unmeasured hymn of merit and glory, whose feet were decorated with the jewels of royal crowns, who was the ornament of earthly sovereigns, the destroyer of rival kings, even as Govinda‡ himself.

8. He prospers—he the ultimatum of wonderful manliness, the abode of fame, the asylum of beauty, the dwelling place of all kinds of learning, the shelter of justice—he the centre of all light, the source of charity, the home of enjoyment, the jewel of all speech, the store-house of goodness, the personification of all good qualities.

9. He, having by his arms protected the land of dependant kings, became the protector of the good,§ and revived the festivity of the destroyer of Kāṇṣa. This Keśava Deva (*alias* Govinda), who had whirled his discus at his enemies, has, through his anger, brought to an end all the children of the race of his antagonists; (or who has destroyed the Sīsupāla of his enemies).||

\* The words Navagīrvāna and Kharavāna are so placed that either of them may pass for a proper name, or both may be epithets. I take at random the first for the proper name. The second may be an *alias*.

† There is a *double entendre* here in the word Nanda. Even as Lord Kṛishṇa took shelter with Nanda, the cowherd, so did he betake to nanda (pleasure).

‡ The god Kṛishṇa. The two words Keśava and Govinda have been so introduced as both may stand for proper names, one in illustration of the other. Probably both were the names of the same person, and the poet has availed himself of the fact to play upon them.

§ *Sadvrindāvāna*. There is a play upon this word which once means the town Vrindāvāna near Mathurā where Kṛishṇa dwelt in his childhood, and once the good people—*sat* good, and *vrinda* collection.

|| Sīsupāla, king of Chedi, was an enemy of Kṛishṇa, and killed by him in a single combat. The word means a number of children—*śiśu* "child" and *pāla* "a herd."

10. He has, by the vigour of his arms, brought this earth under one royal umbrella, wishing not to allow the existence of any foreign possession.

\*11. He has appointed his hands to replace the Kalpa tree, his valour to replace the sun, his fame to serve the purposes of the moon, and his arms to supply the place of Ananta (in upholding the earth). His eyes alone have the courage to override his ears (*i. e.*, his eyes were so long that they extended as far as the ears; or that his virtuous course—the course founded on the observance of Vedic rules—none dared to disturb).

12. Having effected the gratification of all well-disposed people, having, by the play of his sword, subjugated all sides, and having cast far away all other kings, this king governs as the chief of eastern kings (or greater than all former kings).

13. His well-earned white glory, bright as the moon, has made the earth white; it has blighted the bud of the inimical lotus; it has blown the lily of enjoyment. Is it giving delight by moving on constantly, or by remaining fixed? Is it the result of any cause, or is it eternal? It is wonderful.

14. The unrivalled fire of the king's vigour flourishes. How wonderful it is? It becomes manifest by the vapour of inimical kings, (though vapour is no characteristic sign of fire); it is not blown out by the tears of enemies (though ordinary fires are extinguished by water); it causes torpidity in hostile potentates, (while ordinary fires dispel torpidity). It has enveloped the quarters of the earth (even as ordinary fires envelope wood; a play upon the word *kūshṭha*, which means both wood and quarters). It licks the sky (even as the flame of a large fire does).

15. That king, engaged in battle, caused two prominent things to be bent low by his two qualities, (*guṇa* strings)—by one string his bow, by the other, perceivable by the great, the host of his enemies.

16. By the glory of that king, bright as the rays of the laughing moon, and of illimitable might, the whole earth has been overpowered—a glory that has leaped across many oceans.

17. Now, Bhagavān Vāṇasvara, of form without a beginning, the source of the earth, the lord of the three worlds, unwilling to abide in Kailāsa, descended on earth and dwelt at Haṭṭapātaka.

18. That king, whose feet are emblazoned by the crest-jewels of kings, and who is the noblest of all kings, presented to that crescent-crested divinity, in different villages,

19. Lands to the extent of 375 plough measures and 296 houses.

20. He, the devotee of Śiva, gave to Śiva, the lord of Śrīhaṭṭa, many slaves and men of various races. In Chātāpaḍādeva 35 ploughs, and houses 110. In Baḍagrāma, ploughs 13. In Mahāvāpura, plough 1. In Haḍhī-

thánáka, ploughs 7, houses 6. In the north of Degigáñ, plough 1. In Navapanchana, ploughs 5, house (?). In Ayatanika, ploughs 7. In Siddava, house 1. In Amanáta Bhavika, ploughs 6 (?) In Gudhavayika, houses 3. In Kátáváchha, ploughs 3. In Konárka (some epithets unintelligible), house 1. In the town of Yitháyi, ploughs 17, houses 4. In Nenrivatága, houses 3. In Odhátithárka, ploughs 3, houses 11. In Kaiváma, ploughs ?, house 1. In Bálusigráma, ploughs 5. On the west of Navachha, ploughs 5, houses . In Athinahátika, ploughs 5, houses 8. To the south of Kadhadhiyá, to the east of Gosyayá, to the north of Gováta, to the west of Babani, ploughs, 18. To the south of the river Savagá, ploughs 5, houses 3. To the north of that river, ploughs 35, houses 13. To the north of that river and the east of Vátisasta, house 1. To the north of that river, west of Ghatibhú, and south of Sarvabhú, ploughs 7. To the north of the river Kíniyáni and the east of Yegamyaganiyá, ploughs 8½, houses 7. To the south of the river, the east of Thabasonti and the west of Bháskaratenkuri, ploughs 15, houses . In the two villages of Nátayána within Jagáyá, ploughs 5, houses 30. In Saná-gayadúka, to the east of Amikáthi, and the west of Ságara (sea ?), ploughs 10. To the south and north of Kániyáni river, ploughs 8½. To the south of the Nágáyi river, ploughs 6, houses 10. In Bhogádhaopáda, to the north of Bádhadha (a hollow), ploughs 9, houses 9. To the west of Tathogásana and the north of Haṭṭavava, ploughs 7, houses 10. In Baḍasochasa, to the south of Sátakopá, ploughs 10. In Chedgambuḍika, ploughs 3, house 1. In Aḍánakúthi, houses 8 \* \* \* \*. In Nadyánika, ploughs 8 house 1. In Bhúka, to the east of Upamsivo and the north of Athávi, ploughs 80, houses 13. In the village of Naḍakuṭi, houses 8. In that village to the north of the river Thága, houses 6. In Bhúka, to the east of Gosvepapota, to the north of the cattle-path, to the south of Hádi Ganga (tank) to the west of Dhanukundoḥi, ploughs 5. In Pochháníyá, ploughs 10. In Devagásana, ploughs 5. In—to the north Jopábasuyá, house 1. In Bhátaghada 10, also house 1. In Badagopagadú, 1. Also there—house for—7.

In Bhátapadá—(unintelligible) house 1,—house 1, —houses 5. Also in Nidova—cooking houses 5. In Nido—cooking houses 3. In Bhátapadá—houses for cooking—3. In the town of Piápi houses for—3. In the village of Sihádava—cattle-shed 1 (a line unintelligible) are given. By Sagara and many other kings land has been given; to whomsoever the land belongs for the time being to him belongs the reward (of such gifts). Whoever resumes land, whether given by himself or by others, becoming a worm in ordure, rots therein along with his ancestors. In the era of the first king of the Pándava race 4328.

*Transcript of Inscription No. I.*

- १ । ॐ नमः शिवाय ॥ यः कर्त्ता भुवनत्रयस्य तनुभिर्विश्वं प्रथिव्यादिभिर्विद्येदं प्रियते  
य ईश्वर इति ज्ञातो-
- २ । भवन्नापरः । यः संज्ञात्रयमेक एव भजति चैगुण्यभेदाश्रितो ब्रह्मोपेन्द्रमहेश्वरेति जग-  
न्नामीशाय
- ३ । तस्मै नमः ॥ त्रिपुरहरशिरःकिरीटरत्नं स्वरयुवनेरभिषेकरौप्यकुम्भः कुसुमविशिख-  
बाणशाणचक्रं
- ४ । जयति निशान्तिलकसुषाररोचिः ॥ वंशेस्य भूमिपतयः कति ते निष्पारपौरुषा जाताः ।  
येषां यशः-
- ५ । प्रशस्तिर्भूवि भारतसंहितैवास्ति ॥ अथ विश्रुतप्रभावः प्रभवः स्वच्छराज्यकमलायाः ।  
समजनि नवगीर्वाण
- ६ । एः खरवाणः क्षाभुजां श्रेष्ठः ॥ तस्यात्मजा राजपितामहोभूत् मन्त्रीपतिर्गोकुलदेव-  
नामा । यस्य प्रता-
- ७ । पार्कैवचोपि विर्न दिशन्त्यरिज्जापतिजायमुद्राम् ॥ तस्मादमन्दभुजमन्दरमथमान-  
प्रत्यर्थिपार्थिव-
- ८ । समुद्रसमुद्भूतश्रीः । नारायणोऽजनि मन्त्रीपतिरन्वकारि येन स्वयं स भगवान् श्रितन-  
न्दकेन ॥ तस्मादसी-
- ९ । मगुणगौरवगीतकीर्तिर्भूपालमौलिसण्णिमण्डितपादपीठः । श्रीमान् क्षितीन्द्रतिलको  
रिपुराज-
- १० । शोधी गोविन्द इत्यजनि केशवदेव एषः ॥ यः सीमाद्भुतपौरुषस्य यशसां वासश्रिया-  
माश्रया विद्या-
- ११ । नां वसतिर्नयस्य निलयो धाम्नान्देकास्पदं । त्यागस्यायतनं विलासभवनं वाचः-  
कलानां निधिः ।
- १२ । सौजन्यस्य निकेतनं विजयते मूर्त्तौ गुणानां गणः ॥ दोर्दण्डेन समुद्भूतक्षितिभृतां  
संरक्ष्य गोमण्ड-
- १३ । लं सद्गुह्यन्दावनमादरेण विद्धत् उच्छिन्नकंशोत्सवम् । श्रीमत्केशवदेव एष नियतं  
चक्रोऽवशेषं दद्या यः
- १४ । चैकं शिशुपालमपरिकुले क्षिप्रारिचक्रो ह्यपः ॥ कृत्वा येन भुजौजसा वसुमतीमेकान्त-  
पचामि-
- १५ । सां लोकोऽस्मिन्नभिलष्यते विजयिमानन्याधिकारस्थितिः । पाणिः कल्पतरुः पदे  
दिनकृतः कृत्य-
- १६ । प्रतापो यशः शीतांशोर्विषये न्यधाय भुजगाधीशाधिकारे भुजः ॥ यस्मिन् शासति  
निषिद्धाना-

- १७। दिमहीपालदीक्षया चौषीम् । नृतिपथलङ्कनसाहसमासीत् कान्ताहशमेव ॥ अथ  
सुहृत्सक्त-
- १८। मुदं विभावयन् प्रसाधिताशः करवाललीलया । सुदूरमुत्थारितराजमखलो रुराज  
पूर्वावनिभट्-
- १९। शिरोमणिः ॥ करोति धवलं जगत् विनयतेऽरिष्योद्धमं तनौति कुमुदं यशः सहश-  
मस्य च-
- २०। न्द्रोत्तमः । सितं किमथ रत्नकं भ्रमदनारतं किं स्थिरं सकारणमिदं सत् किमिव  
नित्यमित्यङ्ग-
- २१। तम् ॥ वाष्पैर्दुष्प्रीतिनीनां यद्यसनुमितोऽमूर्च्छितो यद्रूपेण कीलाक्षैर्यत्नेनाति  
द्विषदवनिभुजां-
- २२। जायमर्चिर्वितानैः । काष्ठानां यद्वतीत्य प्रकरमुपययावम्बरं खेलिहानक्षेनाश्चर्यक-  
सीमा जयति नर-
- २३। पतेः कोपि तेजःकृशानुः ॥ चौषीभुजा युगपदाक्षवसङ्गतेन तेनोन्नतद्वयमनामि-  
गुणद्वयेन एके-
- २४। न कार्मुकमसीमसहः प्रकर्षगम्येन वैरिनिवहः सहसापरेण ॥ महीभुजाजीयत चन्द्र-  
चासकरेण ते-
- २५। नामितविक्रमेण । विलङ्घितानेकपयोधिनेयं खेनेव कृत्वा यशसा धरित्री ॥ अथा-  
लि कैलासनि-
- २६। वासनिपृष्ठः क्षतावतारो भुवि चट्टपाटके । अनादिक्रपो जगदादिरप्ययं त्रिलोकना-  
थो भग-
- २७। वान् वटेश्वरः ॥ शशिशेखराय तस्मै चपशेखररत्नविस्फुरश्चरणः । प्रददौ नाना-  
ग्रामे निखिलव्यप-
- २८। ग्रामणीरेषः ॥ अधिकं पञ्चसप्तत्या भूचलानां शतत्रयं । शतद्वयस्य वाटीनां पञ्चवत्या  
समन्वितं ॥ नाना-
- २९। परिजनांस्तस्मै जनजातीरनेकशः । प्रादात् श्रीहृदनाथाय शिवाय शिवकीर्तनः ॥  
चाटापङ्कादेवसत्ते भूच-
- ३०। ल १५ ॥ वाटी ११० वङ्गगामे भूचल १२ मङ्गवापुरे वाटी १ चडीथानाके भूचल ७  
वाटी ६ देशिगानोत्तरे भूचल १ नव-
- ३१। पञ्चने चल ५ वाटी + आयतनीके चल ७ शिडडवे वाटी १ अमनाटे भविके भूचल-  
६ गुडवथीके वाटी २ काटा वाङ्-
- ३२। ते भूचल २ आथानिकृते जनीघनाकोणार्के वाटी १ यिथायिनगरे भूचल १० वाटी  
४ नेचवतागे वाटी २ थोङ्गाति-
- ३३। थार्के-छतकवभूचल २ वाटी ११ कैवामे चला(P) वाटी १ बालूसीगामे चल ५ नव-  
बादी-पश्चिमे चल + + + भूचल ५ वा-

- १५। डी अथिनचाटीके भूचल ५ वाटी ८ कडडिया दक्षिणे गोखया पूर्वे गोवटोत्तरे ववनी-  
पश्चिमे-
- १६। भूचल १८ सवगानथी (दी) दक्षिणे भूचल ५ वाटी १ तथा नद्युत्तरे भूचल १५ वाटी  
११ तथा नद्युत्तरे वाटी-
- १७। सल पूर्वे वाटी १ तथा नद्युत्तरे घटीभूपश्चिमे अर्धभूदक्षिणे भूचल ७ कानियानी  
नद्युत्तरे योगम्यगणि-
- १८। या पूर्वे भूचल ८ वाटी ७ तथा नदीदक्षिणे थवसोन्नीपूर्वे भास्करटेकुरीपश्चिम  
भूचल १५ वाटी +
- १९। जगायान्तरे नाटयानघामद्वये भूचल ५ वाटी १० सनागदङ्गाके अनीकाथीपूर्वे साग-  
रपश्चिमे भू-
- २०। चल १० कानियानीनदीदक्षिणात्तरे भूचल ८ वाटी १० भोगाडतवाड-
- २१। डोत्तरे भूचल ९ वाटी ९ तथोगासने पश्चिमे चट्टवोत्तरे भूचल ७ वाटी १० सातको-  
पादक्षिणे वडुघोच-
- २२। स भूचल १० चेन्नम्बुङ्गीके भूचल १ वाटी १ झाडाणकाथीके वाटी ८ भूके + ग + न-  
द्यानीके वाटी ८ मे + पवा-
- २३। कवाटी १ भूकेउपस्थिते पूर्वे आथावी उत्तरे भूचल ८ वाटी ११ नडकुटीगामेवाटी  
८ तथागामे थागन-
- २४। दुत्तरे वाटी ६ भूके + गोखेपपोतपूर्वे गोपथ + तरे चडीगाङ्गदक्षिणे घनकुण्डेडी  
पश्चिमे कवगा-
- २५। सनचल ५ पोखानिया अथानि उत्ताक भूचल १० + द्य देवगासन पूर्वे भूचल ५  
वो वाङ्गा दक्षि-
- २६। को जोगावनिचा उत्तरे वाटी १ भाटपडाके केदाकादिवावगूड १० तथा केतीचताका-  
दि गोपगूड
- २७। तथा व + पाकादि ते चडड तथाकेकाख नोविन्दाग्ट १ वङ्गामे गोपगदा १  
तथा के आवपा-
- २८। नाकादिवावगूड ७ जोगाडतावानि निमावगूड । ते गूड भाटपडाकटाथाना । न +  
उगडाकानि गूड
- २९। भाट पडावपच । तत्पथाननि विवाकवाकादिसाना गूड भाटपडा निमेवाका-  
दि गो गूड भाट
- ३०। पडानिजापित गोनिनु । ग्ट १ वजकसिवम्पाग्ट १ बोवातुहानि वंवावाटाथि  
पाकाथि ग्ट ५
- ३१। तथा । निडे + वे + + कादि ग्ट ५ नवभाड । निडे X भाट पाकादि ग्ट  
१ भाट पडा निवापपाका-

- ५१ । दि च्छडिपम्ट्च १ पिआपि नगरे सोन्ये नविका + दि म्ट्च १ पिआडवपाने द्वाक-  
विवजवि गो म्ट्च १
- ५२ । कोधी ऊरुको मचासल्लो कोधी-सरुण कोधीनो छतां वूढोभां चविषडोसपच  
आसिए न पिआया
- ५३ । आपियाचे भाल + ड द्य आकादयः प्रदत्ताः ॥ वज्रभिवैसुधा दत्ता राजभिः सग-  
रादिभिर्यस्य यस्य
- ५४ । यदा भूमिसस्य तस्य नदा फलं ॥ खदत्तां परदत्तां वा यो हरेत वसुधरां स विद्यायां  
हमिर्भूला पि-
- ५५ । ढभिः सच पच्यते ॥ पाण्डवकुलादिपालाब्द ४२९८ ।

*Translation of No. II.*

Salutation to Nárāyaṇa. May Kamalākānta (the husband of Kamalā), blue as the precious sapphire, (or) as the lightning-streaked cloud, and arrayed in charming golden drapery, protect you !

2. The lord of nectariferous beam\* prevails—he the lion that destroys the herd of elephants formed of lofty and even more lofty masses of darkness,—he the crest-jewel of Mahādeva.

3. In his race was born the crest of the earth. By his birth the noble deeds (of his race) became radiant. He was the all-giving tree (Kalpa tree) to the desires of all who bore arms: he was Gokula, the protector of the earth.

4. His son, the noblest among wielders of arms, the Mandāra mountain in the great ocean of arms, by beauty and loveliness made most charming in appearance, was Nárāyaṇa.

5. He was the receptacle of all arts, the home of all merit, the assemblage of valour, the substratum of civility, the ocean of gentlemanliness. He was of prominent beauty, and of renowned deeds, the crest-jewel of the universe.

6. Unto him was born as son Keśava Deva, the lord of mighty vigour, the oppressor of enemies, a hero like Govinda,† great as the lord of trees, (Kalpa tree,) whose feet were adorned with the crest-jewels of kings.

7. By his merits, delightful to hear, were attracted hosts of learned Brāhman, who, having got all their desires gratified, thought not again of their own native places.

8. When he ruled the earth kings never slept even at night, always thinking what precious wealth they should present to him.

9. He, the great king, master of an army of innumerable war-boats, infantry, cavalry, and lines of rutting elephants, made the earth glorious by his fame, white as Kunda flowers.

\* The moon. † This may be the proper name and Keśava Deva the epithet.

10. He, the mighty, presented to the destroyer of Kañśa, a lofty stone temple, the discus on whose towering crest so cut up the clouds of heaven that they fell in showers of rain.

11. By (his performance of) the rite of Tulápurusha\* the Bráhmaṇs got so much wealth that they were covered with golden jewels, and became like unto the all-giving tree of desire, (Kalpa tree).

12. From him descended, even as Rádhuleya (Kártika) from Maheśa, (Śiva), or the victor light from the son of Rohiṇi (the moon), Isánadeva, of glorious deeds, the moon among kings.

13. When his mighty army of infantry, cavalry and elephants issued forth, on victory intent, the dust raised on earth eclipsed the glory of the sun.

14. When his war-boats plied on the aqueous highway, the water was so splashed in masses that it soothed his chariot horses, fatigued by the oppressive rays of the sun.

15. That glorious king built, for the enemy of Madhukaiṭabha, a mansion which licked the clouds, and the flags flowing on its towering crests looked like flowers on acreal trees.

16. Under this lord of the earth there was an able minister† of the name of Vanamálí Kara, a brilliant light in the race of Vaidyas.

17, 18. By his advice this patent (*sásana*) for two ploughs of land with its dwelling land and corn-fields was issued by the king. It should be upheld by the kindly disposed, by the childless eldest prince, as also by the virtuous wife of the dead prince and his infant son.

19. This was suggested by the commander-in-chief Víradatta, the noble lord of battles, the valiant, and the patient, whose fame had spread to the limits of the quarters of the earth.

20. Whoever resumes land, whether given by himself or another, rots as a worm in ordure along with his ancestors.

21. This eulogium was composed by the learned Mádhava, the noblest of the Dása tribe: may it last unchanged as long as the ocean, the hills and the earth remain in existence. 1 Vaiśakha, Samvat 17.

### Transcript of Inscription No. II.

- १। ॐ नमो नारायणाय ॥ महानीलमणिश्यामः सुवर्णवचिराम्बरः पा-  
 २। तु वः कमलाकान्तः सविद्युदिव वारिदः ॥ तुङ्गेऽनुकृतमः सोमनाभ-  
 ३। युष्मद्गोविन्दः । मौलिरत्नं महेशस्य जयत्यम्बतदीर्घिनिः ॥ तदम्बयेभू-  
 ४। दुवनावतंसः स्त्रीयोदये प्रोज्ज्वलकीर्तिराशिः । सशस्त्रकण्ठहृदंससार्थे-

\* A rite in which a donor weighs himself severally against gold, silver, rice &c., and presents those articles to Bráhmaṇs.

† *Paṭṭanika* equal to the *Patnák* of Orissa and *Paṭṭandýaka* of other inscriptions.

- ५। कल्पद्रुमो गोकुलभूमिपालः ॥ तस्यात्मजः ब्रह्मभृतां विप्रिष्टः सम्भ्रान्तब्रह्मा-  
 ६। र्णवमन्दराद्रिः । शिवा हृदा सङ्गतमङ्गुमूर्तिर्बभूव नारायणदेव एषः ॥ निधिः क-  
 ७। लानां भवनं गुणानां श्रेय्यस्य राशिर्विनयस्य भूमिः । सौजन्याद्योनिधिर-  
 ८। द्रतन्त्रीः प्रख्यातकीर्तिर्भुवनवतंसः ॥ तस्योदनेजा रिपुराजश्रीर्वा मेवि-  
 ९। न्दवीरो द्रुमनाथसंज्ञः । क्षापालचूडामणिमण्डिताङ्गः पुत्रोऽभवत् केश-  
 १०। वदेवदेवः ॥ गुणैर्धृदीयैः श्रवणाभिरामैराकृष्यमाणा गुणिनस्त-  
 ११। मन्नात् । आगत्य सम्पन्नमनोरथाश्च न सख्यवर्जन्मभुवं द्विजेन्द्राः ॥  
 १२। यस्मिन् मर्हो शासति भूमिपाला निद्रां रजन्वासपि नाधिजग्मुः । सच्चि-  
 १३। न्तयन्तः परितोषहेतोः सम्यक् विश्राण्यितुं वसुनि ॥ निःसीमनोवाटकप-  
 १४। तिवाजिप्रभिन्नदन्तावलसैन्यसम्पत् । स राजराजः कुमुदावदातेर्थशो-  
 १५। भिरब्धौ विमलीचकार ॥ स मन्दिरं कंसनिखूननस्य शिलाभिर्द्वैर्विदधे  
 १६। महेजाः । यत्तुङ्गशृङ्गस्थितचक्रधाराचताः चरन्त्यम्बु घनादिवस्थाः ॥  
 १७। तुलापुरुषदानस्य सम्प्राप्य द्रविणन्दिजाः । कल्पवृक्ष इवाभवन् हेमाल-  
 १८। ङ्गारभूषिताः । तस्यान्महेशादिव बाहुलेयः पीयूषरश्मेरिव रौचिणेयः ।  
 १९। श्रीमानभूतिर्मलकीर्तिराशिरोग्रानदेवः क्षितिपालचन्द्रः ॥ यजैवथाचाप्र-  
 २०। चलत्पदातिपुरङ्गदन्तावलसैन्यकीर्णैः । रजोभिरब्ध्याः परितृष्यमाणश्च-  
 २१। द्रोन्महाः सद्यमिमिलदर्कः ॥ यदीयबौवाटककेलिपातघातेऽन्वहद्वारिभिर-  
 २२। ग्ररश्मः । रथेक्षुरङ्गेरभिसन्तपङ्क्तिः सन्तापशान्तिः सुतरामलम्भि ॥ विनि-  
 २३। र्ममसौ मधुकैटभारेः प्रासादमर्धलिङ्गमूर्जितश्रीः । यत्तुङ्गशृङ्गप्रचलत्पताका-  
 २४। नभस्सरोर्मञ्जरिकेव भाति ॥ एतस्य शशिबीभर्तुराजपट्टनिकः कृती । वैद्य-  
 २५। भ्रप्रदीपः जीवनमालिकरोभवत् ॥ अस्य विज्ञापनाङ्गुपः शासनं कृतवानयम् । राजपु-  
 २६। त्रो यः स्वविरः पुत्रशून्यः खल्लतः ॥ पात्य भूदलद्वयं सवाक् सत्यवेक्षणं  
 २७। मृतस्य राजपुत्रस्य पत्नी या कुलपालिका । शिशुश्च तनयः तस्याः पात्यमेव तयो-  
 २८। रपि ॥ आदेशिकोभूत् समरप्रवीरः श्रीवीरदत्तः शतनाधिनाथः । दिग्-  
 २९। न्तसंक्रान्तयश्रप्रशस्तिः प्रतापवानूर्जितधैर्यराशिः ॥ खदनां परदनां वा यो  
 ३०। चरेत् वस्तुभरः । स विष्ठायां कृमिभूला पिष्टभिः सद्य पच्यते ॥ एतां प्रशस्तिं विदधे वि  
 ३१। वेकी श्रीमाधवो दासकुलावतंसः । यावत् समुद्रा गिरयश्च यावज्जीयात् क्षितौ ताव-  
 दिदं शस्यत् ॥ सं १७ वैशाखदिने १

The following papers were read—

1. *On the Calcutta Water-supplies, past and present.*—By A. PEDLER, F. C. S., F. I. C., &c.

(Abstract.)

This paper was divided into three parts. The first was devoted to the consideration of the quantity and quality of the old supply which ex-

isted before the introduction of the present hydrant water. In speaking of the old supply it was assumed to be to a great extent confined to the various tanks and shallow wells distributed throughout the town, for though there is no doubt that the river water was used considerably by the inhabitants who lived near the river, yet the greater number of the inhabitants, living as they did at a distance from the river, must have depended for their supply of household water on the tanks and wells nearest to them. As to the quantity of the old supply, even if it be assumed that it was possible to store up the water which fell in the rainy season for use during the dry months of the year, and granting that one-fifth of the rainfall found its way into the tanks and shallow wells, then each inhabitant of the town could not have had more than 6 or 7 gallons of fresh water daily, and an inhabitant of some parts of the northern division could not have had more than 3 or 4 gallons. The conclusion seems to be inevitable, that, at the time when Calcutta depended for its water supply on its tanks and wells, the inhabitants must have used the same water over and over again, though of course without knowing it.

The state of affairs as to quality was even worse than as to quantity, and the analyses which have been made show at the very lowest estimate that, of the 200 samples of Calcutta tank and well waters examined, forty-four per cent. were true sewages, twenty-two per cent. were dilute sewages, twenty per cent. of the waters were contaminated with considerable quantities of sewage, nine per cent. were "dirty waters," and about four or five per cent. only were moderately safe waters. These last consisted principally of the well kept tanks on the maidan, and two or three others in the southern part of the town. A detailed examination of the results also showed that the tanks and wells of the northern divisions are much more impure, than those of the southern sections of the town.

The second part of the paper dealt with the present water supply of Calcutta which consists of the Hooghly water pumped from the river at Pultah, where it is collected in settling tanks, and after subsidence it is filtered through sand and supplied to Calcutta.

It appears that the total daily supply of filtered and unfiltered water in Calcutta for the past year was 8,556,025 gallons, equivalent to 19.92 gallons per head of population, or practically there were 20 gallons of water available for domestic and sanitary purposes for each inhabitant. This though perhaps not an abundant supply is a fairly liberal one, and is very much larger in quantity than the old supply from tanks and wells. It is, however, not equal to the quantity allowed in most European towns, for the average daily water supply of English towns is about 25 gallons per head of population. In this country, however, it would appear that a more liberal supply would be required than in a European climate, and it is

therefore proposed to double the present supply of filtered water, in which case Calcutta would receive a daily supply of 16,000,000 gallons, equivalent to 37·2 gallons per head. If this proposal is carried out, the supply of filtered water will be most abundant, and it will be amply sufficient for every possible want of the town so long as it keeps to its present dimensions.

From the analyses of the hydrant water, it appears that the Calcutta water falls just outside the class of waters of "great organic purity," but that it is well within the class of waters of "fair organic purity."

On comparing the hydrant water with the average composition of *unpolluted* upland surface water as given by Dr. Frankland, it is found that it is scarcely so pure as unpolluted water should be, and it must therefore be admitted that the Hooghly water has been slightly contaminated before it reaches Pultah. The amount of contamination is, however, not very great and, as pointed out before, the Calcutta water falls well within the class of waters of medium purity. That the Calcutta water must be contaminated to a certain extent must be obvious to any one who is acquainted with the customs of the inhabitants of India, and more particularly of the inhabitants of villages and towns on the banks of the rivers. This contamination is a drawback to the complete safety of the water supply, for a water once contaminated is always more or less dangerous as a water supply. It does not, however, at present appear to be possible to cut off these sources of contamination, and the hydrant water though good is not a perfect supply.

The third part of this paper was devoted to the consideration of the extension of the present water supply. It has been proposed to collect the water from the river within 3 or 4 miles of Calcutta, but it is shown by the analytical numbers that water collected from these places would be decidedly impure, and a strong opinion is expressed that the water for the extension of the supply should be collected at Pultah as has been hitherto done.

Dr. Mitra remarked that the paper read would prove valuable to the Municipal Commissioners of Calcutta, who were engaged in considering a project for the doubling of the water-supply of the town, and hoped that it would be published early. He was glad to notice that great emphasis was laid on the inadequacy of the present supply, and on the necessity of increasing it largely. He did not, however, entirely agree with Mr. Pedler in the conclusions he had come to with regard to the extent of the water-supply in former times. There was never any want of water; there was enough and to spare. The sources of the supply were not limited to tanks and wells, as stated in the paper: the river yielded the largest supply. All along the western side of the town, the people depended mainly on the

river ; they bathed there, and drew their supply for domestic consumption entirely from it, limiting the well-water available in their homes to washing of floors and courtyards, and other coarse purposes. People in the centre and the eastern parts also drew their supply of drinking water from the same source. There was a great number of people who earned their living by carrying river-water in banghis from house to house, and they not only carried the water all over the town, but also to the suburbs, and water was purchased at the home of the speaker, three miles to the east of the town, at two annas per banghi load. For bathing and washing of clothes there were numerous tanks, and no want of water was ever felt in the town. The real difficulty was the *quality*, and not the *quantity*. The well-water was, as it is now, horribly stinking, and tanks frequently could not but contain very filthy water, utterly unfit for potable purposes. River-water too was muddy, and at times saline. The practice, therefore, was for all well-to-do people to obtain the river-water in the month of January, during the second quarter of the moon, and at ebb tides, and to store it in large jars for the consumption of the whole year. Those who could not afford to do this, drew their supplies for a fortnight at a time, on the 6th, 7th or 8th of the moon during ebb-tide. The water in such cases was invariably clarified by the addition of a small quantity of an emulsion prepared by rubbing the nut of the *Strichnos potatorum*, (*nirmali*) on a stone, or by the addition of a little alum. This promoted the precipitation of all earthy matter contained in the water. This clarification was resorted to even by those who drew their supplies daily, and in such cases the water was allowed to stand for 24 hours before it was drunk. The higher classes used porous sandstone filters, for improving their drinking water ; and many collected rain water and stored it for use. It was a common practice among rich Hindus and Europeans to set up large sheets on housetops, or on open courtyards, to catch the rain-water in gumlows, whence it was transferred to jars for use during the rainless months. The practice ceased since the importation of carbon filters from Europe. All these expedients were, however, troublesome, and not at all accessible to the poorer classes, who suffered greatly from unwholesome water. The filtered supply from Pultah has, therefore, proved a great blessing to them. The complaint now is that that supply is insufficient, and nothing short of a very large increase will suffice to remove it. In this respect a common mistake is the acceptance of European data for the calculation of the wants of a tropical population. The habits, customs and wants of the latter bear no relation to those of the former. The loss sustained by excessive heat during the greater part of the year, and the necessity of frequent washings and bathings, are such that even the doubling of the European datum would not cover them ; and it is of the utmost importance that this should be fully

borne in mind by those who are engaged in devising a scheme for increasing the water-supply of Calcutta. As shown by Mr. Pedler most of the existing tanks were very offensive, and should be obliterated as soon as possible, and this cannot be done until the pure supply is greatly increased, for in a tropical climate nothing can be a greater calamity than scarcity of water; and it is far better to have an abundance of impure water than a scanty one of pure water. No man, however intelligent he may be, will, when impelled by heat and thirst, abstain from impure water when he has nothing better at command. Europeans in this country did not always bear this fully in mind, and hence there was a great difference of opinion among them, and the people of the town.

Mr. Waldie said that he had listened with much interest to the statements that had been made. His own experiments, made many years ago, just before the new processes for the examination of potable waters had been published, were, notwithstanding the imperfection of previous processes, quite in accordance with those obtained more fully and perfectly by Mr. Pedler. He had found the tank waters he had examined generally very bad; even the waters of the best maidan tanks were decidedly inferior to the river water.

The paper will be published in full in the Journal, Part II.

2. *On the Identity of the place Upello near Delhi with Upaplava, mentioned in the Mahábhárata.*—By PANDIT RISHIKESH BHATTACHARYA of the Lahore Oriental College. Communicated by DR. G. W. LEITNER, Principal, Government College, Lahore.

(Abstract.)

The author, after rejecting various conjectures, made by different persons, as to where the kingdom of Viráta (to which Upaplava belonged) was situated, examines several passages of the Mahábhárata, bearing on the subject and comes to the conclusion, that it must have been situated to the south-west of Delhi, and that, consequently, Upello on the Delhi and Agra road may be the Upaplava of the Mahábhárata.

Dr. Mitra took exception to the statement of the Pandit that the people of Midnapur consider their district to have been Viráta, and thought that the Pandit must have confounded Midnapur with Dinajpur, which has often been described as the Viráta of the Mahábhárata. Dr. Mitra was satisfied that neither the one nor the other had any claim to that name. According to the Mahábhárata the Kurus went on a cattle-lifting expedition to Viráta, and it would be absurd to suppose that they could do so from Hastinapur, their capital, to either Midnapur or Dinajpur. Phonetic similitude has led some people to identify Viráta with modern Berar, but

that too was for the reason assigned untenable. The province must have been close to Delhi, and Mr. Talboys Wheeler had taken it to be modern Hariyáná, noted for its superior cattle, or some place near it.

Dr. Hoernle said that General Cunningham, too, in his "Ancient Geography of India" had determined the position of Virāta in the south-west of Delhi, where the town of Bairāt is now. He also thought that on linguistic grounds there might be some difficulty in the proposed identification.

The paper will be published in full in the Journal, Part I.

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### LIBRARY.

The following additions have been made to the Library since the Meeting held in July last.

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No. 24. *Wurts, A.*—Sur la papaine. Contribution à l'histoire des ferments solubles. *Hébert.*—Histoire géologique du canal de la Manche. *Quatrefages, A. de.*—Cranilogie des races nègres africaines. Races non dolichocéphales. *Chaveau, A.*—Nouvelles expériences sur la résistance des moutons algériens au sang de rate. *Bequerel, H.*—Recherches expérimentales sur la polarisation rotatoire magnétique dans les gaz. *Hennessey, H.*—Sur la figure de la planète Mars. *Certes, A.*—Sur l'analyse micrographique des eaux.

No. 25. *Faye*.—Sur la réduction des observations du pendule au niveau de la mer. *Janssen, J.*—Sur les effets de renversement des images photographiques par la prolongation de l'action lumineuse. *Berthelot*.—Sur la chaleur de formation des oxydes de l'azote et de ceux du soufre. *Huggins*.—Sur le spectre lumineux de l'eau. *Faye*.—Rapport sur un Mémoire de M. Peirce concernant la constance de la pesanteur à Paris et les corrections exigées par les anciennes déterminations de Borda et de Biot. *Elliot*.—Sur le problème de l'inversion. *Sebert*.—Sur un appareil destiné à enregistrer la loi du mouvement d'un projectile soit dans l'âme d'une bouche à feu soit dans milieu résistant. *Darboux, G.*—Sur les transcendentes qui jouent un rôle important dans la théorie des perturbations planétaires. *Forcrand, de.*—Sur un hydrate d'iodure de méthyle.

No. 26. *Desains, P.* et *Curie, P.*—Recherches sur la détermination des longueurs d'onde des rayons calorifiques à basse température. *Berthelot*.—Sur quelques relations générales entre la masse chimique des éléments et la chaleur de formation de leurs combinaisons. *Milne-Edwards, A.*—Sur une nouvelle espèce du genre *Dasyatis*, provenant de la Nouvelle-Guinée. *Quatrefages, A. de*, et *Lamy, L.*—Craniologie des races nègres africaines ; races dolichocéphales. *Chauveau, A.*—Des causes qui peuvent faire varier les résultats de l'inoculation charbonneuse sur les moutons algériens. Influence de la quantité des agents infectants. Applications à la théorie de l'impunité. *Mares, H.*—Résultats obtenus dans le traitement des vignes par le sulfocarbonate de potassium. *Gostinsky*.—Sur une nouvelle forme de galvanomètre. *Sebert*.—Sur un appareil destiné à enregistrer la loi au mouvement d'un projectile soit dans l'âme d'une bouche à feu soit dans un milieu résistant. *Le Bon, G.* et *Noël, G.*—Sur l'existence dans la fumée du tabac, d'acide prussique, d'un alcaloïde aussi toxique que la nicotine et de divers principes aromatiques. *Bonchardat, G.*—Sur la transformation de l'amyène et du valéryène en cymène et en carbures benzéniques. *Diculaufait, L.*—Le zinc : son existence à l'état de diffusion complète dans toutes les roches de la formation primordiale et dans l'eau des mers de tous les âges. *Peuch, F.*—Sur la transmissibilité de la tuberculose par le lait.

No. 1. *Janssen*.—Sur la photographie de la chromosphère. *Chevreul*.—Sur la vision des couleurs. *Berthelot*.—Sur quelques relations générales entre la masse chimique des éléments et la chaleur de formation de leurs combinaisons. *Thalen, R.*—Sur les raies brillantes spectrales du métal scandium. *Troost, L.*—Sur la densité de la vapeur d'iode. *Nilson, J. F.*—Sur les poids atomiques et sur quelques sels caractéristiques de l'ytterbium. *Miquel, P.*—Des bactéries atmosphériques.

London. *Revue Critique*,—Vol. IX, Nos. 24-28.

— *Revue des deux Mondes*,—Vol. XXXIX, No. 4 ; Vol. XL, Nos. 1 and 2.

No. 1. *Cantacuzène-Altiéri, O. la princesse*.—Le Mensonge de Sabine. I. *Vacherot, E.*—Les nouveaux Jacobins. *Boissier, G.*—L'empereur Julien, d'après de récentes publications. *Fouillée, A.*—La morale contemporaine. I. La morale de l'évolution et du Darwinisme en Angleterre. *Blerzy, H.*—L'Angleterre au temps de la restauration. II. Le triomphe des conservateurs. *Valbert, G.*—La force et la faiblesse des gouvernements démocratiques.

London. Journal des Savants,—June 1860.

*Franck, A.*—Histoire de la philosophie en France. *Quatrefages, A. de.*—Les crânes finnois. *Lévy,*—L'expression musicale. *Gruyer, M.*—Le Jouer de violon, par Raphaël.

—, Revue Scientifique,—Vol. XVIII, Nos. 51-52; Vol. XIX, Nos. 1-3.

### BOOKS PURCHASED.

**FERGUSSON, J.** The Illustrated Hand-book of Architecture: being a concise and popular account of the different styles of architecture prevailing in all ages and in all countries. 8vo., London, 1859.

**MACCRINDLE, J. W.** The Commerce and Navigation of the Erythræan Sea; being a translation of the "Periplus Maris Erythræi" by an anonymous author, and of Arrian's account of the Voyage of Nearkhos, from the mouth of the Indus to the head of the Persian Gulf. 8vo., Calcutta, 1879.

**MOOR, E.** The Hindu Pantheon. 4to., London, 1810.

**REEVE, LOWELL.** Conchologia Iconica,—Nos. 322-3, 324-5, 328-9, 332-3, 334-5, 336-7 and 338-9.

**SOWERBY.** Thesaurus Conchyliorum,—Parts 33-34.

**WHITNEY, W. D.** A Sanskrit Grammar; including both the Classical Language and the other Dialects of Veda and Brahmana. 8vo., Leipzig, 1879.





# PROCEEDINGS

## OF THE

# ASIATIC SOCIETY OF BENGAL.

FOR NOVEMBER, 1880.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 3rd November, at 9 o'clock P. M.

II. B. MEDLICOTT, Esq., F. R. S., in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the British Museum,—A Catalogue of the Greek coins in the British Museum (5 Vols.), edited by R. S. Poole.

2. From the Society of Telegraph Engineers,—Catalogue of Books and Papers relating to Electricity, Magnetism, the Electric Telegraph &c., including the Ronalds Library, by Sir F. Ronalds, edited by A. J. Frost.

3. From the Zoological Society of London,—Catalogue of the Library of the Zoological Society of London.

4. From the Marine Survey Department,—(1) General Report on the operations of the Marine Survey of India, for the year 1878-79; (2) Return of Wrecks and Casualties in Indian Waters for the year 1879, and (3) Charts of the Samuic Strait, Langsuen Roads and Approaches, and Laçon Roads.

5. From the St. Xavier's College Observatory,—Observations taken at the Observatory from January to June 1880.

6. From the Home, Revenue and Agricultural Department,—A Grammar of the Eastern Hindi compared with the other Gaudian Languages, by Dr. A. F. R. Hoernle, (2) The Life of Alexander Duff, D. D., LL. D. (2 Vols.), by G. Smith, and (3) The Cave Temples of India, by James Fergusson and James Burgess.

7. From the Sanskrit Text Society,—(1) Vaitāna Sūtra, the Ritual of the Atharvaveda, edited, with Critical Notes and Indices, by Dr. R. Garbe, and (2) Vardhamāna's Ganaratna Mahodahi, with the Author's

Commentary, Part I, edited, with Critical Notes and Indices, by Julius Eggeling.

8. From the Authors,—(1) The Kings of Kashmir, by Jogesh Chandra Dutt, (2) Kaiser Akbar, Ein Versuch über die Geschichte Indiens in sechzehnten Jahrhundert (Part I), by Graf. F. A. Noer, (3) A Brief Account of the Early History and Antiquities, Castes and Traditions of the Hamirpur District, by V. A. Smith, and (4) On the mode of Occurrence and Distribution of Diamonds in India, by V. Ball.

9. From the Boston Society of Natural History,—Contributions to the Geology of Eastern Massachusetts, by W. O. Crosby.

10. From the University of Athens:—(1) *Catalogus Systematicus Herbarii Theodori G. Orphanidis*, Fasc. I, *Leguminosæ*, by Th. de Heldreich, and (2) *Synopsis numorum veterum qui in Museo numismatico Athenarum publico adservantur*, by A. Postolacca.

11. From the Munich Academy of Sciences,—Ignatius von Loyola an der Römischen Curie, by A. von Druffel.

12. From the Madras Government,—(1) A classified Index to the Sanskrit MSS. in the Palace at Tanjore (Part III), by A. C. Burnell, and (2) some lead coins found in the Kistna District.

13. From the Maharaja of Kashmir,—2 copies of Chapters 5—21 of the *Prayascitta Bhag*, with commentary.

14. From the Department of the Interior, U. S. America,—Report of the U. S. Geological Survey of the Territories, Vol. XII.

15. From the Society of Agriculture &c. of Lyons,—*Monographie Géologique des Anciens Glaciers et du Terrain Erratique de la partie moyenne du Bassin du Rhone (Atlas)*, by A. Falsan and E. Chantre.

16. From the Foreign Department,—*Tribes of the Hindoo Koosh*, by Major J. Biddulph.

17. From R. L. Jack, Esq.,—Geological Sketch Map of the District between Charter Towers Goldfield and the Coast.

18. From the Meteorological Reporter to the Government of India,—Report of the Meteorology of India in 1878.

19. From the Government, N. W. P.,—(1) *Mathura*, a District Memoir (second edition), by F. S. Growse, and (2) *The Ramayana of Tulsi Dās*, Books III—VI, by F. S. Growse.

20. From the Secretary of State for India,—Vols. 59, 60 and 62 of the Hakluyt Society's publications—(1) *The Voyages and Books of John Davis the Navigator*, (2) *The Natural and Moral History of the Indies*, by Father Joseph de Acosta, Vol. I, (3) *The Commentaries of the Great Afonso Dalboquerque*, Vol. III.

21. From the Trustees Indian Museum,—*Indian Museum. Annual Report, Lists of Accessions, and Selected Extracts of Minutes, April 1879 to March 1880.*

22. From the Batavian Observatory,—Observations made at the Magnetical and Meteorological Observatory at Batavia, Vol. IV.

The following Gentlemen duly proposed at the September meeting of the Council were balloted for and elected Ordinary Members—

1. Lieut. R. R. N. Sturt, B. S. C., proposed by G. Hughes, Esq., C. S., seconded by P. Johnstone, Esq., C. S.

2. Babu Kshiroda Chandra Raya, proposed by Dr. R. L. Mitra, seconded by A. Pedler, Esq.

3. Rev. Charles Swinnerton, proposed by H. B. Medlicott, Esq., seconded by Alex. Pedler, Esq.

4. Babu Pramatha Nath Bose, B. Sc., F. G. S., proposed by H. B. Medlicott, Esq., seconded by W. T. Blanford, Esq.

The PRESIDENT announced to the meeting that, in accordance with Rule 7, the following Gentlemen had been balloted for and elected Ordinary Members by the Council during the recess—

1. R. W. Nicholson, Esq.

2. Lieut.-Col. M. G. Clerk.

3. Babu Benod Behary Mullick.

4. Babu Sib Chunder Nag.

5. Khalif M. Hassan, Khan Bahadur.

6. E. M. Sage, Esq., proposed by R. Gordon, Esq., seconded by A. Pedler, Esq.

7. R. C. Lees, Esq., proposed by L. Schwendler, Esq., seconded by A. Pedler, Esq.

The elections were confirmed by the general meeting.

The following Gentlemen are candidates for ballot at the next meeting.

1. W. Gritson Jackson, Esq., C. S., Mirzapur, proposed by H. Rivett-Carnac, Esq., C. S., seconded by Dr. G. Thibaut.

2. Dr. Kirton, proposed by Dr. J. M. Coates, seconded by J. Wood-Mason, Esq.

3. R. D. Oldham, Esq., A. R. S. M., proposed by H. B. Medlicott, Esq., seconded by W. T. Blanford, Esq.

4. Moulvie Dilawur Hasein Ahmad, proposed by Moulvie Kabir-uddin Ahmad, seconded by A. Pedler, Esq.

5. J. R. Napier, Esq., proposed by L. Schwendler, Esq., seconded by A. Pedler, Esq.

6. H. W. McCann, Esq., D. Sc. etc., proposed by Dr. Hoernle, seconded by A. Pedler, Esq.

The SECRETARY reported that Dr. D. O'Connell Raye and Mr. E. O'Brien had withdrawn from the Society, and that Pandit Mohanlal Vishnulat Pandia had compounded for his future subscriptions.

The SECRETARY reported that 4 gold coins from the Collector of Budaun had been acquired under the Treasure Trove Act.

• With reference to the notice, at the May meeting, of works sanctioned for publication in the Bibliotheca Indica, the Secretary announced that Dr. L. Schroeder had been permitted to withdraw his edition of the *Maitráyani Samhitá* and that in its place the *Apastamba Sūtra* had been substituted, to be edited by Dr. R. Garbe. The *Apastamba Sūtra* is a very rare and important work connected with the Black Yajur Veda. It consists of three sections, divided into 30 chapters. The first section of 24 chapters contains the *Srauta Sūtras*. It is this section that will be edited by Dr. Garbe. The section on the *Dharmasūtras* has already been edited by Dr. G. Bühler, and that on the *Grihya Sūtras* is in the hands of Dr. Eggeling. Dr. Garbe's edition will give the text accompanied by the commentary of Rudradatta. The edition will be based on a collation of two or three complete and several fragmentary manuscripts of the work.

The SECRETARY read two letters from Major J. Waterhouse regarding the proceedings of the Blochmann Memorial Committee in England.

Major Waterhouse states in a letter, dated July 16th, that Mr. W. T. Blanford and himself had consulted with Mr. Grote, and that they had visited the studios of various sculptors in London. They had decided on entrusting the commission to Mr. E. R. Mullins, who has already executed a bust of the late Mr. Woodrow, which is now in the Calcutta University. Mr. Mullins is to receive one hundred guineas for making the bust of the late Mr. Blochmann. In a further letter received from Major Waterhouse, dated September 8th, he states that the model of the bust is making satisfactory progress, and Mr. Mullins had, in the opinion of Mr. Blanford and himself, secured a very fair likeness of the late Mr. Blochmann.

1. The Philological Secretary exhibited some gold and silver coins forwarded by Mr. H. Rivett-Carnac, and read some remarks by him on the same.

Mr. Rivett-Carnac says—

"I have the pleasure of forwarding for the inspection of the Society 2 silver and 4 gold coins recently dug up near Jellalabad, and procured for me there by Lieut. A. Durand of the Central India Horse.

"The two large silver coins are of Eucratides of a well known but I believe not common type. It will be noticed that they are in beautiful preservation.

"The other two silver coins are of Antiochus; on the obverse will be noticed what seems to be a 'horned Horse.'

"I have also obtained a gold coin of Antiochus of the same type and a gold one of Euthydemus which are both sent for the inspection of the Society. These coins are in beautiful preservation.

"I should be glad to know whether all these coins are known to the Society. Unfortunately I have no books with me to which I can refer.

"I have mentioned 2 silver coins of each but I send one only, as there is no object in sending two exactly the same.

"By this opportunity I also send 2 gold Roman Coins found by Col. Berkeley, Political Agent at Rewah, in the Maharajah's subterranean Treasury. The one appears to be of Septimus the other of Pertinax. Col. Berkeley has very kindly permitted me to submit them for the Society's inspection; and I am confident that his courtesy in the matter will be much appreciated by the members.

"In continuation of former correspondence I now send 2 gold coins, apparently Roman, found by Colonel Berkeley, Political Agent, Sutna, in the subterranean Treasury of the late Maharajah of Rewah after his death.

"Col. Berkeley to whom the credit of the discovery of these interesting coins is due, is good enough to desire that the Asiatic Society should have an opportunity of seeing these coins, and he would wish for the opinion of Dr. Rudolf Hoernle and General Cunningham thereon."

2. The Philological Secretary exhibited a photograph of 3 Indo-Aryans, sent for the inspection of the Society by Dr. G. W. Leitner.

3. The Secretary exhibited an Afghan helmet sent for the inspection of the Society by Lieut. R. C. Temple, and read a letter descriptive of it.

"I have the pleasure to send herewith a brass helmet sent down from Kabul by an officer at the front.

"It has no marks of age about it except the polish of the brass and the date on the plate which I read as 882 or 677 according to which side of the rim of the plate is considered uppermost. H. 882 would give us A. D. 1478 circ. and H. 677 circ. A. D. 1280. I should not be inclined from its appearance to ascribe this age to the helmet.

"The chain appears to be English and not to belong to it.

"I read the plate thus inside

اول قواينوازي الو اكبـر

and round the rim

كارخانه لار ( ٢ ) السلطان كابل

date ٨٨٢"

Mr. Westland pointed out that the helmet was so distinctly modern and European in shape (regular Ellwood pattern), that there must be the gravest doubts as to its antiquity. The ornamentation too was the regular British idea of a lion-face and had nothing oriental about it. The only argument for its antiquity was the fact that in a factory-mark upon it the figures 8, 8, 2, appeared in contiguity, but they might represent any num-

ber of other things besides the Hijra dato. In fact, even taking them as intended for a date, there was another unaccounted for figure beside the 2, namely an 1 or an alif. He could not pretend himself to any knowledge of such subjects, but he had been informed on enquiry that writers of Arabic characters sometimes reversed their usual practice of writing the figures thus—units, tens, hundreds, thousands, and wrote them like the English, *viz.*, thousands, hundreds, tens, and units. And if the figures upon this inscription were thus read, it gave the date 1288, exactly twelve years ago.

He also pointed out that the inscription referred the helmet to the “arsenal of the Sultan of Kabul,” and said that it was very doubtful if a potentate existed, except in recent times, who could claim that title.

A few remarks were made by several other members present on the manufacture and present appearance of the helmet, and the general opinion seemed to be that it was of very modern manufacture.

4. The Philological Secretary read a letter from Mr. C. Girdlestone regarding the legend on Mr. Gennoe’s medal, which was exhibited at the June meeting.

Mr. Girdlestone writes—

“I have just been looking through the Asiatic Society’s Proceedings (No. VI), for June 1880, and it appears to me that the legend on Mr. Gennoe’s medal quoted at page 100 means to convey the words Sri 2 (do) Swami Ji Jalh (or Jalhu).

“The use of Sri with a numeral after it to express the degree of honour is common in Nepal. Thus in official parlance the Maharaj Adhiraj (Sovereign) of Nepal is Sri Páñch (5) and the Prime Minister Sri Tin (3). The British Resident is also sometimes addressed as Sri Tin.”

Dr. Hoernle remarked that he was glad to see that Mr. Girdlestone’s reading of the inscription on the medal was a confirmation of that already given by Dr. Mitra and himself at the meeting of June.

5. A letter was read from Dr. Mitra forwarding an extract from a letter from General Cunningham on the locale of the two Buddha-Gayá inscriptions noticed in the Proceedings for April last.

Dr. Mitra says—

“In my remarks on the two Buddha-Gayá inscriptions, published in the Proceedings for April last, there is an omission which should be supplied. When I exhibited the inscriptions I knew not the exact locale where they had been found. General Cunningham has now favoured me with the information. In a letter, dated Simla, August 30, he says: ‘The two inscriptions which I brought from Buddha Gayá and which you have translated, were found in different places. The larger one was found in the mound to the north of the Tárádevi temple, where an excavation was made to furnish

bricks for the Burmese dwelling house. The other smaller inscription was found on the opposite side of the great temple; that is to the south of it. But neither of the inscriptions was *in situ*.' The statement that the inscriptions when found were not *in situ* is of great importance. It shows that they had been brought from somewhere else, and unless this is admitted the cave mentioned in one of them would be inexplicable. It is certain that the rubbish mounds did not exist when the cave was cut, and it could not therefore have been a cutting in a heap of earth, even if it could be assumed that such a cutting would be deemed worthy of an inscription. The record gives the locale of the cave to have been Jayapura, the site of which I have not yet been able to identify. A reduced facsimile of the record is annexed for ready reference. (Plate VIII.)"

The NATURAL HISTORY SECRETARY then exhibited the skin and skull of a male tailless rat which had been sent to the Society by Dr. J. E. T. Aitchison. The animal is recognized as the *Lagomys rufescens* which was first described by Dr. Gray from Afghanistan, and which was afterwards rediscovered by Mr. W. T. Blanford near Kohrad north of Ispahan in Persia, where it lives at elevations exceeding 8,000 feet. The present specimen was obtained by Dr. Aitchison at an elevation of from 11,000 to 12,000 feet amongst boulders on the Safed Koh Range, Mt. Sika Ram in the Kuram valley.

The following papers were read—

1. *On some experiments instituted to supply all the lines terminating at the Calcutta Telegraph Office with currents tapped from the main current produced by a Dynamo-Electric Machine.*—By LOUIS SCHWENDLER, Esq., M. I. C. E., &c.

Mr. Schwondler gave an outline of his paper explaining the latest experiments he had made in order to prove the practicability of his new method of supplying signalling currents. This method was published in the Journal of the Asiatic Society, Part II, Vol. XLIX, 1880, and in the Philosophical Magazine, No. 52, December 1879, Supplement. After certain incidental delays, the final trial came off on Sunday, the 29th August, 1880.

One of the Dynamo-Electric Machines, employed for lighting the sheds at Howrah Railway Station, produced the required strong main current, and the signal currents were conveyed from Howrah to the Calcutta Telegraph Office by an ordinary Telegraph line about 2 miles in length.

In all eleven long main circuits were supplied with telegraph currents in this manner, *viz.*, the lines to Bombay, Madras, Kurrachee and Rangoon. The currents sent from Calcutta, and the currents received at the out-stations were measured, and by it the satisfactory result was established that in all the lines, even in the longest, the tapped or machine currents were

considerably stronger than the currents produced by the ordinary signalling batteries at present in use.

The trial lasted for 3 hours under the direct supervision of Mr. C. B. P. Gordon, the Superintendent of the Bengal Division, who carefully watched the working of the office. The traffic was despatched with regularity in the ordinary manner.

At the beginning of the trial the main current was produced through an iron wire of 0.21' diameter, offering a resistance of 1.5 B. A. U. This main current was carefully measured, and found to be equal to 36801 milli-oersteds. At the end of the trial the main current was produced through the arc of an electric lamp, giving a light of about 6000 Standard candles when measured under an angle of 45° with the horizon. In this latter case the main current amounted to 45706 milli-oersteds.\*

The total current tapped from the main current (when all the eleven lines were simultaneously sending) equalled 129 milli-oersteds, quite an insignificant fraction of the large main current.

Mr. Schwendler stated that this practical trial of the method had shown that it was perfectly reliable, and no practical Telegraph Engineer would doubt that it was very convenient to produce the currents in this manner. It was therefore under consideration to introduce the system at the Calcutta office. Mr. Schwendler concluded his paper with some suggestions for utilizing the larger portion of the current not required for Telegraph purposes, saying: "The useful work for the main current at night would most conveniently take the shape of an electric light to illuminate very efficiently the Signal-office. The electric light would produce at least 50 times less heat than if the same quantity of light was obtained by combustion, and this is no doubt a great advantage in a hot climate like that of India. During the day time the main current might be used for pulling the punkhas, lifting messages, or, more generally, for working a pneumatic system of despatching messages between the Head Telegraph office and local centres in Calcutta. If Calcutta had the good fortune to possess a colder climate, it might be suggested to use the heat developed by the main current in a coil of iron wire, for warming rooms. It would then only be necessary to lead the wire along the walls in a manner similar to that in which rooms are often heated by hot water pipes; only the electrical method would be far more economical. The quantity of heat given out by such a wire is by no means small. In one case it was equal to 20473  $\Omega$  ergs per second equal to 488 Grm. degree-centigrade per second. This is about equal to the heat produced by an ordinary Ger-

*One Oersted is equal to one Weber per second.*

*One Milli-Oersted is equal to one Milli-Weber per second.*

man Stove consuming 6 lbs of coals per hour, supposing that the loss of heat when coals burn under a steam boiler is about four times greater than when they burn in a German Stove. It appears therefore that the heat emanating from the wire should suffice to keep a moderately sized and ordinarily ventilated room at a comfortable temperature even when situated in the highest latitude."

The paper will be published in full in Part II of the Journal.

2. *On a Celt of the Palæolithic type, found at Thandiani, Punjab, September 10th, 1880, by Charles Francis Mussy-Swynnerton. By the REV. CHARLES SWYNNERTON.*

This unmistakeable relic of the Stone Age is especially interesting as being, I believe, only the second of its kind which has yet been discovered in the Punjab.

The first was found in the vicinity of Attock by Mr. W. Théobald, and a description of it appeared in the Records of the Geological Survey, Vol. XIII, Part 3.

A front and a side view of the present specimen, exactly the size of the original, are given in Plate IX. The stone out of which it was chipped is black close-grained limestone. Its weight is thirteen tolas. Its edges and angles are considerably worn from the effect of soft pressure, or from exposure. It was found by my little son. The peculiarity of the shape of this interesting curiosity attracted his fancy in one of his daily walks, and he brought it back with him to the bungalow as a plaything, not of course knowing its nature or its value.

It should be added that the geological formation of the locality in which it was found is almost uniformly light grey limestone (*not* of the character of that of which the celt is fashioned), and that the elevation is about 8,400 feet.

3. *Contributions to the History of Bundelkhand.*—By V. A. SMITH, C. S.

Abstract of Part I.

Mahoba traditions assert that a Gaharwár Ráj at some undefined date preceded the famous Chandel dynasty.

The traditions are indistinct, and little is known of the dynasty except that many tank embankments were made in its time; a list of eleven of these is given, all of them being situated within a radius of 15 miles from Mahoba.

This circumstance indicates that the Gahawár principality was a small one.

It is conjectured that it was established in the seventh century, after the dismemberment of the kingdom of Harsha Varddhana king of Kanauj, which doubtless included Mahoba.

The Gahawár rulers of Bundelkhand may have been connected with the Gahawár dynasty of Kanauj.

According to the Mahoba traditions the Gaharwárs were succeeded by Partháá chiefs, who were displaced by the Chandels.

General Cunningham is quoted to show that the little state of Uchahara or Nagod, between Álahabad and Jabalpur, which is still ruled by a Parihár chief, is a fragment of the larger Parihár kingdom which included Mahoba.

The traditions of several places in the Hamirpur District affirm the former existence of a large Parihár State.

The traditional dates assigned for the establishment of the Chandel dynasty are then examined.

These dates are variously given as 201 : 225 : 661 : 677 : and 682, Samvat.

The writer believes that the dates 204 and 225, should be, as General Cunningham suggested, referred to the era of Sri Harsha in 607 A. D. ; and, differing from General Cunningham, suggests that the dates 661, 677 and 682 should be read 561, 577, and 582, and referred to the newly discovered Chedi or Kulachuri era beginning in 249 A. D.

The date 831 A. D. is assumed as the date for the overthrow of the Parihárs by the Chandels.

Some miscellaneous traditions relating to early Parihár immigrations into Bundelkhand are then given.

#### Abstract of Part II.

The general outline of the Chandel genealogy and chronology having been already settled, this essay deals with disputed and doubtful points, and the collation of the published and translated inscriptions of the Chandel dynasty is carried further than has yet been attempted.

The writer also aims at setting forth in an intelligible and concise form all that is now known regarding the reign of each of the Chandel kings.

The appended chronological table sets forth the principal conclusions which have been reached, and will be found on examination to differ considerably from any hitherto published.

Kirtti Varmma I (*alias* Deva Varmma Deva *alias* Bhúmpála), who reigned from about 1149 to 1150 A. D., is held to have been the conqueror of Kámer Kulachuri king of Chedi *circa* 1095 A. D., and to be the Kírat Brahm of tradition.

Gaya Varmma of the coins and of the Man-Chhatarpur and Kaling No. II inscriptions is shown to be the same as Kirtti Varmma (the second) of the Angási copper plate.

It is further proved that only one Sallakshana Varmma reigned, not two, as has been supposed.

The prominent position of the Jain sect in the reign of Madana Varmma (*circa* 1130-1165 A. D.) is noticed.

The second conquest of Chedi by Madana Varmma is discussed; the writer believing this event to have occurred about the year 1160 A. D.

Reasons are given for believing that about that time the Chandel dominions extended to Bilharí near Jabalpur, the territory now known as the Sagar and Damoh districts being administered by a chief still remembered as Rájá Belo or Belá.

Madana Varmma Deva was succeeded by Paramárdi Deva, commonly known as Parmál or Parmar, who died in 1202.

Attention is called to the fact that none of the coins of this king are known, and that no building can with certainty be ascribed to him, and that only one inscription appears to be known as certainly dated in his reign. Reason is shown for believing that little credence can be given to Chand's account of the war between Parmál and Prithiráj of Delhi.

*Chronological Table of the Chandel Dynasty 831—1182 A. D.*

No.	Rájá.	Date A. D.	Event.	Authority.
1	Námika.	831	Accession, and overthrow of Parihars at Mahoba.	Tradition and calculation.
2	Vákpati.	850 862	Accession. Bhoja king of Kanauj in possession of Chandel.	Date calculated Inscription at Chanderí, Arch. Report, IX, 84.
3	Vijaya.	870	Accession.	Date calculated.
4	Rahila.	890	Accession.	....
5	Hurcha.	910	Accession.	....
6	Yaso Varmma.	930	Accession.	....
7	Dhanga.	940 954	Accession. Building temple at Khajuráho	.... Chaturbhuj inscription.
		978	Assisted in battle of Lumphin.	Faaishta.
		998	Gift of land	Nunama, No II inscription.
		999	Death at Prayág.	Lalaji inscription.
8	Gandá Deva.	999 1008	Accession. Assisted Rájá Júpál of Lahore against Mahmúd of Ghazni	Ditto and Man Chhatarpur inscription. Faaishta.
		1011	Rájá Kohall.	Inscription at Khajuráho.
		1021	Conquered Kanauj	Faaishta.
		1023	Surrendered Kálanjar to Mahmúd of Ghazni.	
9	Vidhyádharma Deva.	1025	Accession.	Date calculated.

No.	Rájá.	Date A. D.	Event.	Authority.
		1030	Gángxaya Deva king of Chedi ruling at Tripuri.	Abú Rihán.
10	Vijaya Pála Deva.	1035	Accession.	Calculated date.
11	Kírtti Varmma Deva the First, <i>alias</i> Deva Varmma Deva <i>alias</i> Bhúmipála.	1049	Accession.	Date calculated.
		1050	Grant of land by Deva Varmma Deva.	Nunama, No. I inscription.
		circa.		
		1080	Defeat of Karna of Chedi. First issue of Chandel coinage.	Exact date conjectured.
		1097	In possession of fort of Deogarh.	Inscription at Deogarh.
12	Sallakshana Varmma Deva.	1100	Accession.	Date calculated.
13	Jaya Varmma Deva <i>alias</i> Kírtti Varmma Deva the Second.	1110	Accession.	Date calculated.
		1116	Láláji inscription re-written.	Láláji inscription.
14	Prithví Varmma Deva.	1120	Accession.	Date calculated.
15	Madana Varmma Deva.	1130	Accession.	Date calculated.
		1131	Image of Varadá set up at Kálinjar.	Maisey's, No. IV inscription.
		1133	Grant of land.	Angási copper plate.
		circa.		
		1143	Construction of Bela Tál at Jaitpur.	Tradition.
		1154	Jain image set up at Mahoba.	Nemináth inscription.
		1158	Ditto ditto.	Sumatináth ditto.
		"	Ditto, at Khajuráho.	Sambhunáth ditto.
		circa.		
		1160	Conquest of Chedi.	Date conjectured.
		1163	Jain image set up at Mahoba.	Ajitanáth inscription.
		1164?	Inscription set up at Kondalpur?	Sir Wm. Sleeman.
		circa.		
		1160	Rájá Bels built Singor-garh. Bilhari held by a Chandel governor.	Ditto, and Central Provinces Gazetteer.
		to		
		1165		
16	Paramárdi Deva, known as Parmál or Parmár.	1165	Accession.	Date calculated.
		1167	An inscription recorded.	Inscription.
		? 1171	Inscription recorded at Kálinjar.	? Inscription.
		1182	Capture of Mahoba by Píthiráj of Delhi.	Inscription of Píthiráj (unpublished).

*Inscriptions of the Chandel Dynasty of Bundelkhand.*

No.	Inscription.	Date.		Reference.
		Samvat.	A. D.	
1	Chaturbhuj. *	1011	954	The inscription is on a large slab built into the wall on the right side of the entrance to the Chaturbhuj temple at Khajuráho. It has never been published nor translated. Noticed in Arch. Report, II, 426.
2	Jinanáth.	1011	954	On left jamb of door of Jinanáth's temple at Khajuráho. Never published nor translated in full. Abstract translations in Arch. Report, II, 433 and J. A. S. B. XXIX, p. 395. See also J. A. S. B. XLVIII, Part I, p. 287 and plate.
3	Nunama, No. II.	1055	998	Copperplate; original in Indian Museum. Transcribed and translated in full in J. A. S. B. XLVII, pp. 80 seqq.
4	Lálájí or Visvanáth.	1056	999	On a large slab built into wall inside entrance of Lálájí or Visvanáth temple at Khajuráho. Translated by Mr. Sutherland in J. A. S. B. for 1839. Vol. VIII. p. 159, but with many errors, some of which were corrected by General Cunningham in Proc. A. S. B. for 1865 (1) p. 99.
5	Nunama, No. I.	1107	1050	As No. 3.
6	Deogarh.	1164	1097	Engraved on rock. Neither published nor translated; referred to in Arch. Report, IX, 108.
7	Inscription at Mahoba.			Gave genealogy from Dhanga to Kirtti Varmma. Mentioned in Arch. Report, II, 447, but never published nor translated, and the original not now to be found.
8	Supplement to Lálájí inscription.	1173	1116	As No. 4.
9	Maisey's No. IV.	1188	1131	Original* at Kálinjar, near figure of 'Mahádco ká putra'; letters very faint. Transcribed and translated in J. A. S. B. XVII. (1) pp. 191 and 321-322. Text and translation require revision. Erroneously mentioned dated in S. 1288 in Arch. Report, II, 448, number 33.
10	Ang	1190	1133	Copperplate; original with Mr. A. Cadell, C. S. Facsimile and transcript and translation in J. A. S. B. Vol. XLVII, Part I, pp. 73 seqq.
11	Nemináth.	1211	1154	Jain Statue at Mahoba. Noticed by General Cunningham in Arch. Report, II, 448. The position of the statue is not known.

No.	Inscription.	Date.		Reference.
		Samvat.	A. D.	
12	Sambhunáth.	1215	1158	Jain statue at Khajuráho. Translated in Arch. Report, II, 435 and noticed <i>ibid.</i> p. 448. Position of statue now is not known.
13	Sambhunáth.	1215	1158	Jain statue lying in water under embankment of Kirat Sagar at Mahoba. Facsimile of part of inscription in J. A. S. B. Vol. XLVII, Part I, Plate XV.
14	Ajitanáth.	1220	1163	Jain statue at Mahoba, position not now known. Noticed in Arch. Report, II, 448.
15	Man-Chhatarpur.			Translated by Lieut. Price in Asiatic Researches, XII, 351.
16	Kondalpur. (†)	915 of Chedi era.	1164	Mentioned as existing at a temple in Kondalpur, Central Provinces, and said to be dated 815 Samvat by Sir Wm. Sleeman in J. A. S. B. for 1837. Vol. VI, (2), p. 627 note. <i>Vide supra</i> discussion of reign of Madana Varma.
17	Mahoba.	1224	1167	Inscription at Mahoba, mentioned in list Arch. Report, II, 448, but nature of inscription and precise locality not mentioned. Original not now forthcoming.
18	Maisoy's No. I.	1228	1171	J. A. S. B. XVII, (1) pp. 313-317. Gazetteer N. W. P. Vol. I, p. 15 note. Arch. Report, II, 448. Original at Kálinjar.
19		1239	1182	Unpublished inscription of Prithiráj, referred to by Genl. Cunningham, Arch. Report, IX, 153, and in private letter-records defeat of Parmál by Pirthiráj.
20	Mahoba, inscription at bungalow.	1240	1183	Abstract given in Proc. A. S. B. for 1879, p. 243. Original at Engineer's bungalow near Mahoba. Full text and translation not yet published.
21	Dahi copper plate.	1337	1280	Arch. Report, II, 455. In No. 34 of table <i>ibid.</i> p. 448, the name of the Rájá is wrongly given as Vira Varma. Neither original nor copy forthcoming, nor translation.
22	Jayadurga, († Ajegarh or Kálinjar) Inscription.	1345	1288	J. A. S. B. VI, 881, and Part III of this essay.
23	Maisoy's No. II.	—	—	J. A. S. B. XVII, (1) 317-320, transcript and translation; original at Kálinjar. No date; but quoted in No. 36 of table Arch. Report II, 448 as being dated S. 1372 = A. D. 1316.

## Abstract of Part III.

The statement of General Cunningham and other writers that Kutb-ud-dín Aibak attacked Kálinjar twice, that is to say, in 1196 A. D. as well as in 1202 A. D., is shown to be erroneous and to rest on a misinterpretation of Farishta.

The passages in Farishta and the contemporary Táj-ul-Maásir relating to the attack on Rájá Parmál Chandel in 1202 A. D. are quoted and discussed, and Chand's stories about the end of Parmál are proved to be untrue.

The Mahoba Kanungo's traditions relating to the events which followed the defeat of Parmál by Prithiráj in 1182 and the rise of the Bundelas in the 14th century are recited at length as a basis for the following disquisition.

The evidence relating to the existence of powerful Bhar chiefs at Mahoba and in the neighbourhood of Kálinjar is fully discussed, with the result that the Bhar rule in Bundelkhand may be dated approximately between the years 1240 and 1293 A. D. The identification of the Dalaki-Malaki or Dalaki-wa-Malaki who was, according to the Muhammadan historians, defeated by Ulúgh Khán in 1248 A. D., with the Tiloki and Biloki or Dal and Bal of Audh tradition is accepted, and this personage is further identified with the Bhar chieftain in power at the time.

The identification of Dalaki-Malaki with the Malika of the Jayadúrga (or so-called Ajegarh) inscription dated 1345 Samvat is rejected.

His identification with Rájá Trailokya Varma Chandel is also shown to be impossible.

The conjecture is hazarded that the Bbars were originally one of the hill and forest tribes of Central India.

The genealogy of the Chandel princes who succeeded Parmál as Rájás of Kálinjar is discussed in connection with General Cunningham's notice of Col. Ellis' Dahi copper plate inscription dated S. 1337.

According to tradition the Bhar rule at Mahoba was overthrown by a Musalmán attack. Reason is shown for believing that this attack probably occurred in the year 1293 A. D., when Alá-ud-dín defeated the Hindús of Bhilsa.

About that time the government of Mahoba appears to have been entrusted by the Muhammadans to the Khangárs of Garh Kurár.

The Khangárs were displaced by a Gaharwár adventurer, the date of which event is shown to be approximately 1340 A. D.

From this Gaharwár adventurer the Bundelas are descended, being apparently the offspring of a marriage between the Gaharwár and a Khangárin.

The following chronological table summarizes the results of the investigation.

*Chronological Table 1182—1352.*

Event.	Date.		Reference.
	Hijri or Samvat.	A. D.	
Defeat of Parmál by Prithiraj,	1239 S.	1182	Unpublished inscription of Prithiraj. (Cunn.)
Capture of Kálinjar, Kálpí and of Mahoba "capital of the principality of Kálpí," by Kutb-uddín Aibak, .....	599 H.	1202	Farishta and Táj-ul-Maásir.
Death at Kálinjar of Rája Parmál Chandel,			Táj-ul-Maásir.
Accession at Kálinjar of Rája Trailokya Varmma Chandel, .....			Dahi copper plate.
Mahoba held successively by Taur Súba, the Mowátis and the Gond, .....		{ circa 1203 to 1239	Mahoba tradition.
Capture of Gwáliar and defeat of Parihá Rája by Altamish, .....	630 H.	{ 1232	Ferishta and Táj-ul-Maásir.
Accession at Kálinjar of Sandhira Varmma Chandel, .....			
Defeat of Chahada Deva of Narwar, .....	632 H.	1234	Conjecture and Dahi copper plate.
			Tabaqát-i-Násiri.
Occupation of Mahoba by a Bhar chief, ..		circa 1240	Tradition and conjecture.
Occupation of Mauze Bharwára in Pamvári by Lodhis during reign of Rája Bhar of Mahoba, .....	1300 S.	1243	Local tradition.
Occupation of villages on bank of Dhasán river by Parihárs from Gwáliar, .....	1303 S.	1246	Local tradition.
Kirat Pál Rája at Kálinjar, .....	1309 S.	1252	Mahoba tradition.
Foundation of shrine of Pír Mobárik Sháh at Mahoba, .....			Ditto.
Defeat of Dulaki-Malakí between Karra and Kálinjar by Ulúgh Khán, .....	645 H.	{ 1248	Farishta and Tabaqát-i-Násiri.
Ulúgh Khán 'marches towards' Kálinjar, ..			
Rája Sandhira Varmma Chandel makes a grant of land, .....	1337 S.	1280	Tabaqát-i-Násiri.
Rája Kirat Singh Bhar makes at Kálpí a grant of land in Mahoba, .....	{ ..	{	Dahi copper plate. Copy of <i>sanad</i> belonging to Kanungo of Mahoba.
Rája Bhoja Varmma Chandel, probably at Kálinjar, .....			
Nána Káyatt his minister, .....	1345 S.	1288	Jayadúrga inscription.
Ala-ud-dín's expedition against the Hindus of Bhilsa, .....	692 H.	1293	Farishta.
Defeat of the Bhar Rája of Mahoba by Malik Hasan Sháh, .....		ditto (?)	Local tradition.
Khangárs of Garh Kurar appointed governors of Mahoba by Delhi court, .....	{ ..	{ circa 1300	Local tradition.
Conquest of Málwa by Ain-ul-Mulk Multání, .....			
Erection of mosque at Bhainsa Darwaza, Mahoba, in reign of Ghiyás-ud-dín Tughlak, .....	704 H.	1304	Farishta.
Khangárs of Garh Kurar and Mahoba overthrown by a Gaharwár adventurer, founder of Bundela clan, .....	722 H.	1322	Inscription on mosque.
Malik-us-Shark Nasir-ul-Mulk governor of Mahoba, Karra and Dalaman, .....	1400 S.	circa 1340	Tradition.
	{ ..	{ circa 1362	Tarikh-i-Mobárik-Sháhí.

4. *English Translations of some Baloochi Poems. Part II.*—By  
M. LONGWORTH DAMES, Esq., C. S.

This paper will be published in the Journal, Part I.

5. *Coins Supplementary to Thomas' Chronicles of the Pathan Kings of Delhi. Part II. With two Plates.*—By CHAS. J. RODGERS, Esq.,  
*Principal of the Normal College, Amritsar.*

(Abstract.)

This paper is a continuation of the author's article, which was published in No. 2 of the Journal of this year. It describes 33 hitherto unpublished coins, beginning with Khugrau Malik; among them several gold and silver coins.

This paper will be published in the Journal, Part I.

6. *Copper Coins of Akbar. With two Plates.*—By CHAS. J. RODGERS, Esq.,  
*Principal, Normal College, Amritsar.*

(Abstract.)

This paper describes 28 copper coins of the Emperor Akbar. The author discusses the value of the coins called *dám* and *tanke* respectively, and comes to the conclusion that 200 tankes and 160 dáms must have been severally equal to 1 Rupee. Accordingly he calculates, that Akbar's revenues must have been equal to Rs. 32,000,000 or £3,200,000, according to the statement of Nizám-uddín, or to Rs. 35,400,000 or £3,540,000 according to Abu'l Fazl; a calculation which differs widely from that of Mr. Thomas who gives £32 millions and £36 millions respectively.

This paper will be published in the Journal, Part I.

7. *Notes on and Drawings of the Animals of various Indian Land-Mollusca (Pulmonifera).*—By LIEUT.-COL. H. H. GODWIN-AUSTEN,  
F. R. S., F. Z. S.

For some years previous to his appointment to the Second Yarkand Mission, Dr. Stoliczka had been working at the anatomy of Indian land-molluscs, and had enriched this Journal with many valuable papers. Amongst the numerous drawings made by native artists under his superintendence were found, after his death, some excellent coloured sketches from life of the animals of various species, with descriptions of the colours of the soft parts written in pencil on the margins of the paper. The author has pasted these drawings in a scrap-book, and, as they were fast becoming illegible, has transcribed the notes, names, and localities as well as he was able to decipher them.

As it may be some years before many of these species are obtained again by a naturalist with the means and ability correctly to delineate

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them, the author has thought that lithographed copies published in this Journal would be not only preserving, but in a measure continuing the labours of so good an observer, and has accordingly prepared two plates illustrating certain species of the family *Zonitidae*. Stoliczka's identifications and remarks are given in full for each species figured in the present paper, and some notes from the author's field-book, with a few identifications of Messrs. Blanford and Nevill, have been added.

The paper will be published in full with two plates in the forthcoming number of the Journal Part II.

8. *On a Species of Trochalopteron from Travancore.*—By W. T.

BLANFORD, F. R. S.

In this paper the author describes a new species of *Trochalopteron* obtained by Mr. F. W. Bourdillon in the S. Travancore Hills. The species, which is named *T. meridionale*, is distinguished from *T. Fairbanki*, its nearest ally, by the much shorter white superciliary stripe terminating above the eye, by there being no brown band behind the eye, by the middle of the abdomen being white, and by other characters.

The paper will be published in the Journal, Part II, No. 3, for the current year.

9. *On a new Species of Papilio from South India, with remarks on the Species allied thereto.*—By J. WOOD-MASON.

In this paper the author describes a new species of rhopalocerous *Lepidoptera* belonging to the genus *Papilio*. The new species is nearly allied to *P. Mahadeva*, Moore, from upper Tennasserim, and is distinguished therefrom by having a submarginal row of spots in the fore-wing in both sexes, and by other characters; it is named *P. Dravidarum*. The paper concludes with some general remarks on allied species; it will be published with illustrations in the forthcoming number of the Journal, Part II.

10. *Description of the Female of Hebomoia Roepstorffii.*—By J.

WOOD-MASON.

The male of this species was described in the last number of the Journal. For the opportunity of describing the opposite sex, the author is indebted to the kindness and courtesy of Captain G. F. L. Marshall, R. E.

Coloured figures of both sexes will eventually be published in the Journal.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in August last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies and Editors.

Batavia. K. natuurkundige Vereeniging,—Natuurkundig Tijdschrift voor Nederlandsch-Indië, Vol. XXXIX.

Berlin. K. preuss. Akademie der Wissenschaften,—Monatsbericht, April, May and June, 1880.

Bombay. The Indian Antiquary,—Vol. IX, Parts 109—111.

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Buenos Aires. Sociedad Científica Argentina,—Anales, Vol. VI, No. 3.

Calcutta. Geological Survey of India, Memoirs,—Vol. XVI, Part 2.

King, W.—The Gneiss and Transition Rocks, and other Formations of the Nellore portion of the Carnatic.

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———. Original Meteorological Observations, April to September 1879.

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Stokes, Dr. W.—On the Calendar of Oengus.

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———. ———. Sitzungsberichte, math. physik. Classe, Nos. 3 and 4, of 1879 and No. 1 of 1880.

———. ———. Philos. philol. Classe,—Vol. I, No. 4 and Vol. II, Nos. 1 and 2 of 1879.

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— Geological Society,—Quarterly Journal, Vol. XXXVI, Nos. 142 and 143.

No. 143 *Jeffreys, Dr. J. G.*—On the Occurrence of marine shells of existing species at different Heights above the present Level of the Sea. *Sollas, W. J.*—On the Genus *Protospongia*. *Sealey, Prof. H. G.*—On *Psephophorus polygonus* von Meycr.

— Institution of Mechanical Engineers,—Proceedings, April 1880.

— Royal Microscopical Society,—Vol. III, Nos. 3 and 4.

No. 3. *Duncan, Prof. P. M.*—On a Parasitic Sponge of the order *Calcarea*. *Cooke, M. C.*—The Genus *Ravenelinia*. *Gibbes, H.*—On the Double and Trouble Staining of Animal Tissues for Microscopical Investigations: with a note on cleaning Thin Cover-glasses. Record of Current Researches relating to Invertebrata, Cryptogamia, Microscopy, &c.

No. 4. Record of Current Researches relating to Invertebrata, Cryptogamia, Microscopy, &c.

— Nature,—Vol. XXI, Nos. 524, 535, 6555, 560—567, 570, 571.

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Part 2. *Huxley, Prof.*—Sensation and the Uniformity of Plan of Sensiferous Organs. *Galton, F.* Generic Images

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— List of Members, 1st December, 1879.

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Part 1. *Ramsay, R. G. W.*—Contributions to the Ornithology of Sumatra. Report on a collection from the neighbourhood of Padang. *Heysham, Col.*—Extract from a letter addressed to the President containing remarks upon two cases of elephants breeding in captivity.

Part 2. *Forbes, W. A.*—Contributions to the Anatomy of Passerine Birds.

Part 1. On the Structure of the Stomach in certain Genera of Tanagers.

- Butler, A. G.*—On new and little known Butterflies from India. *Butler, A. G.*—Description of a new species of Orthopteron of the genus *Anostostoma* from Madagascar. *Saunders, H.*—On the Sea-Birds obtained during the Voyage of Lord Lindsay's Yacht "Venus" from Plymouth to Mauritius in 1874. *Beddome, Col. R. A.*—Description of a New Snake of the Genus *Plectrurus* from Malabar. *Parker, W. K.*—Exhibition of, and Remarks upon, the eggs and embryos of some Crocodiles.
- London. ———. Transactions, Vol. XI, Part 2.  
*Murie, J.*—Further Observations on the Manatee. *Parker, T. J.*—On the Intestinal Spiral Valve in the Genus *Raia*.
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*Hall, J. H.*—The Cypriote Inscriptions of the Di Cesnola Collection in the Metropolitan Museum of Art, in New York City. *Avery, J.*—Contributions to the History of Verb-Inflection in Sanskrit. *Lanman, C. R.*—A Statistical Account of Noun-Inflection in the Veda.
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 No. 1. Inventaire des monuments mégalithiques de France. *Broca*.—Méthode trigonométrique, le goniomètre d'inclinaison et l'orthogone.  
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- Prague. K. k. Sternwarte,—astronomische, magnetische und meteorologische Beobachtungen, 1879.
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*Cell of the Palaeolithic Type, discovered at Thandiani, Punjab, by Charles Francis Massy Strynner, September 10th, 1880. Elevation, 8,400 ft. Original size.*



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR DECEMBER, 1880.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 1st December 1880, at 9 P. M.

H. B. MEDLICOTT, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the British Museum,—Catalogue of Oriental Coins, Vol. V, by S. L. Poole, edited by R. S. Poole.

2. From the Surveyor General of India,—Synopsis of the Results of the Operations of the Great Trigonometrical Survey of India, Vols. VIII and IX.

3. From the Home, Revenue and Agricultural Department,—the Industrial Arts of India, by Dr. G. C. M. Birdwood.

4. From the Superintendent, Government Central Museum, Madras, —10 gold Viraraya Fanams.

5. From the Superintendent, Geological Survey of India,—Popular Guide to the Geological Collections in the Indian Museum, Calcutta. No. 3—Meteorites, by F. Fedden.

6. From the Author,—a Collection of Gesture-signs and Signals of the North-American Indians, with some comparisons, by Lt.-Col. G. Mallery.

The following Gentlemen duly proposed and seconded at the last meeting were balloted for and elected Ordinary Members—

W. Grierson Jackson, Esq., C. S.

Moulvie Dilawar Hasein Ahmad.

J. R. Napier, Esq.

H. W. McCann, Esq., D. Sc.

Dr. Kirton.

R. D. Oldham, Esq., A. R. S. M.

The SECRETARY reported that the following Gentleman had intimated his desire to withdraw from the Society—

W. T. Webb, Esq.

The SECRETARY reported that the elections of Rājā Siva Prasād and of Mr. W. P. Johnston had been cancelled under Rule 9.

The SECRETARY read a letter from the Rev. C. Swynnerton forwarding a sketch of a sculptured stone pendant with a note on the same.

Mr. Swynnerton writes:

"I beg to enclose a rough pencil-sketch of a curious relic which I find among my specimens of Yusafzai sculpture. If you will kindly exhibit it to the meeting of the Society I shall feel greatly obliged.

"Last winter I visited two very singular boulders in the neighbourhood of the Indus at Attock. One is of granite, the other of limestone. They are enormous in size, and they both exhibit 'cup-marks' or 'elf-cups' on their upper surfaces. These marks are very perfect and some of them are in regular lines. The granite specimen was first seen by Mr. T. Barlow, of the Inland Revenue, the other of limestone was discovered by me.

"I shall be glad to send you, later on, sketches and descriptions of these two relics if the Society would care to have them."

The sketch sent was of a sculptured pendant or jewelled ornament worn from the neck, and was the size of the original. The sketch was taken from a piece of sculpture, in slate, which belongs to the ancient Buddhist remains of the Yusafzai valley. Attention was directed to the winged Cupid with which the ornament terminates. The figure is that of a boy. The hands have been broken, but they appear to have been joined together in the usual position of prayer, or adoration, so common among these sculptures. Mr. Swynnerton is doubtful whether there is any such idea of Eros or Cupid, winged, in Hindu mythology, or whether this figure is another proof of the former influence of Greek art in the Punjab.

The NATURAL HISTORY SECRETARY then exhibited some specimens of *Papilio* from South India, representing a new species *P. morgani*.

The following papers were read—

1. *Description of a new species of Brackish-water Mollusca.*—By G. NEVILL, C. M. Z. S.

This paper will appear in the Journal, Part II.

2. *On the Eastern Frontier of Thibet.*—By M. DESGODINS.

The western and southern boundaries of Thibet proper are well known, because they are adjacent to the English Indian empire, either immediately, or mediately through the states of Cashmire and Ladak, Nepaul and Sikkim which are allies of the English Government. The northern boundary too is very well defined, being formed by the immense tract of mountains known under the Chinese name of Kuenlen. This range begins westwards at the Karakorum, and runs to the east as far as the Kookoonor mountains. The eastern boundary on the other hand is almost unknown because it has been drawn through a country inhabited by people of the same race who are subjected to the same Chinese government though in a different manner. This then is a geographical problem of great interest and importance, and, as I have lived for some period in this almost unknown land, I will endeavour to give all the information on this subject I have been able to collect.

Let us start from a well known and indisputable point, the upper Assam country encircled by the Himalaya mountains. At the north-east of the valley, just beyond the Bramakhund on the hills, you find the savage tribe of the Mishmis whose Thibetan name is Nahong. As soon as you have crossed over the Himalayas and the Mishmi tribe, going to the east, you reach the frontier of Thibet proper. This is the district or Subprefecture of Dza-yul, which is under the jurisdiction of the Deba or prefect of Song-nga-kieu-dzong. This prefect governs also two other districts, that of Djrooba, which is exclusively peopled by shepherds living under tents, and that of Tsarong which is well peopled, and which is at the mouth of the Ou-kio river where it flows into the Lou-tse-kiang, and extends further down on the two banks of the Lou-tse-kiang (the Ngeu-kio of the Thibetans and the Salwen of the Europeans). The prefecture and its three subdivisions are to be found in that tract of land which extends from the foot of the Mishmi Himalaya to the Salwen and from 28° to 29° N. latitude; Dzayul is at the east, Djrouba to the south, Tsarong to the south-east, Song-nga-kiendzong to the north-east. They say that this country is relatively well peopled and rich. To the south of Dza-yul and Djrouba are numerous savage, independent tribes belonging to the basin of the Irrawaddy river. To the north, is the principality of Po-yul which does not at all acknowledge the Lhasa government, and very little of the authority of the Chinese government; they would not be reluctant to have commercial intercourse with Europeans if they could. To the south of Tsarong, on the banks of the Salwen is the small Lou-tse tribe which belongs to the Yun-nan Chinese province. If I dwell somewhat at length on this country, whose area comprises only a little more than one degree of latitude and longitude, it is because of its being the only way through which the great river of

Thibet, the Yar-kiou-tsangpo can flow if it goes down to the Irrawaddy. I have, however, been told over and over again by natives well acquainted with the country, that there is no large river flowing through it but only small ones. If so, the Tsangpo cannot be the upper course of the Irrawaddy.

A little below  $28^{\circ}$  N. lat. the frontier of Thibet crosses the Lou-tse-kiang (Salwen), and ascending a very steep spur on the left bank, reaches the main ridge of the mountain range, which separates the Salwen from the Mekong, which is called Lan-tsang-kiang by the Chinese and Dakio by the Thibetans. This range is very narrow, steep, and rocky, the rivers being at a height of about 6000 feet, the passes more than 12,000 feet, and the numerous snowy peaks from 18,000 to 20,000 feet above the sea. Its direction is south to north inclining a little to the west. One of the more southern snowy peaks called Dokéla is most important, not only on account of its being a celebrated place of pilgrimage for the Thibetan devotees of eastern Thibet, but also because it may be considered as the most southern boundary of Thibet proper; the true boundary line of the Yunnan Chinese province and of the Thibetan country being only a few miles below the peak.

Some fifty years ago the boundary wall followed the ridge of the main range as far to the north as  $29^{\circ} 20'$  N. Lat., but owing to the encroaching propensities of the Thibetan government, to the weakness of the Bathang chief, and perhaps to the wickedness of some Chinese official, the Thibetans took possession of the eastern declivity of the mountain from the  $28^{\circ} 30'$  up to  $29^{\circ} 20'$ , so that the Mekong itself becomes the frontier. We must, however, except the two villages of Kiata and Dachu situated at  $29^{\circ} 02'$  on the right bank, which are kept by Bathang and China, on account of the salt-pits which, on both banks of the river, are the centre of an extensive and fruitful trade. On the left bank, the Yun-nan province reaches nearly to  $29^{\circ}$  N. Lat., and then comes the territory governed by Bathang which is part of the So-tchuen province.

About  $29^{\circ} 20'$  the boundary crosses to the left bank of the Mekong, ascends a branch of the chain of mountains up to the main range, then, following a direction east-north-east, passes between the two villages of Bom and Lanten, the first being the last village of the Bathang territory, the second being the first of Thibet proper, both being on the high road which goes from China to Lhasa through Ta-tsien-loo, Lythang, Bathang, Kiangka, etc. This last small town which is nearly due west of Lanten is the residence of the Tiguié or Governor-General of the Kham province. Previous to the beginning of the 18th century, this province extended as far as  $102^{\circ}$  or  $103^{\circ}$  E. Long. At that time an attempted rebellion of the Thibetan Lamas having been quickly put down by a Chinese army, the consequence was, that the twenty-two Eastern Thibetan prin-

cipalities were united to the direct government, either of the Se-tchuen or of the Yun-nan province.

From about the 30th degree N. Lat., the boundary of Thibet runs northwards between the Mekong and Kin-cha or Yangtse rivers; but as the steep, narrow, well-defined ranges of mountains which we encountered south are succeeded northerly by undulating table-lands the boundary is not so well traced as below. This is a perpetual cause of disputes and riots between the shepherds of Bathang and those of Thibet. However, geographically, we can draw the boundary of Thibet by following the watershed as far as 33° N. Then it turns to the north-west as far as 35° N. lat. and 95° E. Long. where it crosses the Yang-tse. From this point it takes a north-easterly direction, till it reaches the mountains encircling Kookoonor, and the main range of the Kuen-len mountains. East of this boundary is, 1st, the principality of Bathang, and 2nd, more to the north, that of Dégué, both under the direct administration of Se-tchuen. West of the same limit and north of Kiang-ka, are the principalities of, 1st, Tehraya; 2nd, Tehamtou; 3rd, San-che-kicou-tso; 4th, Réoukhié; 5th, Nongkine. *By right* these five principalities do not belong to Thibet proper whose civil government they do not acknowledge. They have chiefs of their own under the direct superintendence of the third Chinese ambassador residing at Lhassa. It would have been nothing but just, if from the 30th degree N. Lat. I had drawn the eastern boundary of Thibet proper about two degrees longitude more to the west. However I do not regret having shown myself more generous, first, because these five principalities have not been put under the direct administration of Se-tchuen; secondly, because their real Chinese governor is residing at Lhassa; thirdly, because *in fact* the civil Thibetan government of Lhassa, being more powerful, behaves there nearly as the lion of the fable.

Before closing this note I may add that east of the eastern frontier of Thibet proper there is an area of at least four degrees of Longitude and six degrees of Latitude, which is peopled by the Thibetan race, under the direct Chinese administration. From this most certain fact, some consequences could be drawn, but as they are beyond the dominion of geography I refrain from mentioning them.

M. Desgodins concluded by saying that the real eastern boundary of Thibet proper was that which he had just given and which was indicated in the map which he had prepared. The map will be found at Plate X.

The President said that M. Desgodins had conferred a great favour on the Society by giving the results of his extensive experience in an almost unknown region, and he was sure that the information which he had laid before the Society would prove of the utmost value. In the course of his remarks, Mr. Medicott asked—

Whether some of the Thibetan countries directly governed by China bordered on the province of Assam, to which M. Desgodins replied that such was not the case, the whole of Assam being encircled to the north and east not only by savage tribes, but also by districts directly governed by the Lhasa government, but that being part of Thibet proper they were, *ipso facto*, tributaries to the Chinese Empire.

General Walker observed that this Society had much reason to be indebted to Father Desgodins for his interesting and very valuable communication. The Father has resided for many years on the confines of Thibet in a region which is of the utmost importance from a geographical point of view, as there a breadth of not more than  $4^{\circ}$  in longitude is crossed by several rivers, running parallel to each other, which have long been known to be the highland sources of some of the greatest rivers in Asia. Up to the present time, however, there has been considerable uncertainty as regards the individual identity of the rivers in the highlands with those in the lowlands; and until Father Desgodins communicated the information he had obtained about them to the Geographical Societies of Paris and Lyons, there was not a single map in which errors more or less gross had not been committed in the assignment of their sources to the several great rivers. We are indebted to him for the information, recently corroborated by Captain Gill, that the Lou-tse-kiang river, which has been supposed to be one of the sources of the Mekong or Cambodia river, is in reality the source of the Salween river which debouches into British territory in Martaban. Thus the Salween has a course which is generally parallel to that of the Irrawaddy river below the 27th degree of latitude; but whereas the Irrawaddy is believed by most geographers to have its sources not higher than the 28th degree of latitude, the Salween has been conclusively shown by Father Desgodins to have a much higher origin, probably in Lat.  $33^{\circ}$ , and this is a discovery of great geographical importance.

During a residence of some years at Bathang in the valley of the Kincha or Yang-tse-kiang (Captain Gill's River of Golden Sand). Father Desgodins endeavoured to proceed to Lhasa, but he was unsuccessful in the attempt—as all other Europeans have been of late years. Eventually he moved to the south-west, crossing the valley of the Lan-tsang-kiang or Mekong river, into that of the Lou-tse-kiang or Salween river, in which he resided for three years, about the parallel of  $28^{\circ}$  of Latitude, and at a distance which he estimates as not exceeding 100 miles from the point where the Brahma Kund river enters upper Assam. Here he was in a very favourable position for making enquiries whether any large river flows through the region between the head of the Assam valley and the valley of the Salween river; this must be the case if the Sanpo, the great-

river of Western Thibet, flows into the Irrawaddy, as was formerly supposed, and has latterly been again urged by Mr. Gordon of the Public Works Department in Burma. But the invariable reply to Father Desgodins' enquiries was that there was no such river; and this strengthens the probability that the Sanpo river is one with the Brahmaputra, as has for many years been believed by the generality of geographers, and is in accordance with the latest information obtained by the Trans-Himalayan explorers of the Indian Survey Department.

M. Desgodins then gave some explanations on the point that General Walker had raised as to the great probability of the Tsangpo not being the upper course of the Irrawaddy but that of the Bramaputra: in this opinion M. Desgodins fully coincided.

The reasons which he put forward are these. He had been told that the district of Dza-yul is a rather rich agricultural country: therefore a low one, very likely not exceeding 6,000 feet above the level of the sea. That at the south of this district of Dza-yul there is the district of Djrouba a high uncultivated tableland peopled by shepherds living in tents. If the Tsangpo flowed through Dza-yul (and it could not flow elsewhere) to the Irrawaddy, it would be necessary, for it either to ascend this high tableland, which is absurd, or to flow through an immense cutting or ravine of three or four thousand feet. Though he has had many opportunities of wandering through tablelands in many other places, he has never observed such a feature of plateaux.

2. If there were two high tablelands divided by a large river, this could not escape the notice of the natives of the country. Pagans as well as Christians, who had gone for purposes of trade to Dza-yul, unanimously say there is no large river. Amongst our first Christians were men belonging to several savage tribes of upper Burma. They had been made prisoners of war and sold as slaves to the Thibetans before coming to the missionaries. They also unanimously say that in their own country there are no large rivers. One of them taken prisoner in Assam by the Abords had to cross their country along a large river, which he called Dihong or Dibong (M. Desgodins did not remember exactly which). He thought that it was the Tsangpo flowing through stupendous and fearful precipices.

3. A Lama had travelled all over Thibet on a pilgrimage. He went to worship the sacred lake Tsomapang (Mansarowar of our maps), where the Tsangpo has its source, descended the river as far as Lhasa where he lived for many years, then coming down to Bathang his native country, where he was met by M. Desgodins, he followed again the lower part of the Tsangpo as far as a savage tribe called by Thibetans Lhopa (inhabitants of the south) or Lho-kha-tehra (tattooed inhabitants of the south.) From what he stated about this tribe, M. Desgodins has no doubt they are the

Abords. There the Tsangpo takes a southerly direction, through an awful split of the hills where it flows overhung by fearful perpendicular rocks. This Lama was told by people of the country, that after flowing for some distance through this precipitous channel, the whole of the Tsangpo ended in an immense waterfall, which was so deep that looking from the top to the bottom makes a man's head giddy at once. This Lama held out most stubbornly against M. Desgodins' objections, and maintained that the Tsangpo flowed to the south not to the east, not towards Dza-yul which he knew well, but through the Abord tribe. M. Desgodins observed that all this information from the natives had reference to the country below and above the  $28^{\circ}$  N. Lat. where the maps generally indicate the sources of the Irrawaddy. M. Desgodins believes this is correct if the native information is reliable, because about this parallel there is a high tableland which separates small rivers to the south and to the north. M. Desgodins thinks it is a water-shed of the Irrawaddy and of a small branch of the upper Bramaputra.

4. In answering the objection that the body of water of the Irrawaddy is so great (at least as great as that of the Salwen) that its sources must be much higher up to the north than the  $28^{\circ}$  lat. N., M. Desgodins remarked, 1st, that the Irrawaddy beginning by  $28^{\circ}$  lat. N. is entirely in the zone of very rainy countries, 2nd, that the melting of snow in Thibet sends very little water to the great rivers Salwen, Me'kong and Yangtse. The snow melts at the end of April or beginning of May, at which time the rising of the rivers is only beginning, the great rising commencing only in July and August with the rains. 3rd, M. Desgodins remarked that Capt. Gill, who had pointed out to him the very same objection, acknowledges, 1st, that the Irrawaddy is indeed very large but not very deep, 2nd, that the small river which he followed from Tenyue to Bahmo had suddenly swollen so much in consequence of some rainy days that he understood how the Irrawaddy could have its source only in  $28^{\circ}$  lat. N., the whole surrounding country being situated in the zone of tropical rains. This observation of Capt. Gill's M. Desgodins could corroborate by pointing out some villages at about  $28^{\circ}$  lat. N. on the banks of the Salwen and of the Me'kong, which are at the very limit between dry and damp countries. There is no middle zone. The cause of this phenomenon is apparently owing to the snowy ranges which, from the  $28^{\circ}$  lat. N., run in a northerly direction, and stop the rains coming from the Bay of Bengal.

At the conclusion of M. Desgodins' remarks, the President said he had much pleasure in conveying to him the thanks of the Society for the very valuable paper with which he had favoured them that evening.

3. *On the Lepidopterous Genus Amona, with the Description of a new species.*—By J. WOOD-MASON.

4. *Contributions to Indian Malacology, No. XII.*—By W. T. BLANFORD, F. R. S.
  5. *Report on a visit to Nongyang Lake, on the Burmese Frontier, February 1879.*—By S. E. PEAL.
  6. *List of Mollusca from the Hills between Mari and Thandiani.*—By W. THEOBALD, Dy. Supdt., Geological Survey of India.
- These papers will be published in the Journal, Part II.

## LIBRARY.

The following additions have been made to the Library since the meeting held in November last.

## TRANSACTIONS, PROCEEDINGS AND JOURNALS, *presented by the respective Societies and Editors.*

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# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. I.—1880.

*Description of the Great Śiva Temple of Gangai Kondapuram and of some other places in the Trichinopoly District.—*

*By* LIEUT.-COL. B. R. BRANFILL. (With a Plate)

During the past season I visited and examined the great Śiva temple of Gangaikondā (-Shola-)puram (Gangacondapuram of A. S. 79), situate in the extreme E. N. E. part of the Trichinopoly District, 20 miles S. W. from Chidambaram.

As this is the largest\* and best specimen of a South Indian temple proper I have ever met with, I venture to offer a short description of it. Roughly speaking it is a facsimile of the great Tanjore Temple, possibly its prototype, or perhaps more probably a copy; but never having been “restored,” as the Tanjore example has, and being built throughout in a very hard kind of stone, it retains much of its pristine appearance and purity of design, which has been lost there.

I made notes of my observations on the spot and took measurements, sketches and some impressions of the inscriptions with which its base is covered, as specimens of the character, which is mostly old Tamil, very similar to that at Tanjore.

Gangaikondapuram is the site of a deserted town supposed to have been the city or chief town of Gangaikondā Chōla.

\* The largest Indian sanctuary towers mentioned by Fergusson (Hist. of Arch. Vol. III.) are those of Jaganāth at Puri and the great Tanjore Pagoda, which are 80. and 82 feet square at base respectively.

Most of the inscriptions appeared to be mere statements of gifts made to the temple by private persons. The western and southern (side) inscriptions appeared to be mostly in the Tamil character and language with occasional Sanskrit formulæ to begin and end with. Those on the northern side were said to be chiefly in Grantha and Telugu or other (than Tamil) characters.

The temple consists of a grand stone “*stubi*” (as they called it), a sanctuary *steeple* or *Vimānam* on a raised basement or terrace, decorated by a rail ornament below, having the upright posts engraved with griffins (or *Yāli*), and an elaborate scroll-enveloped animal or figure on every third or fourth post, but no cross-bars or horizontal rails between.

The *Aṭṭaṇi* or terrace-path is 3½ feet wide, surrounding the entire temple, including the great *Veli-mandapam* or Outer court, at a height of about 5 feet above the (original) ground level.

The great pyramidal *Vimāna* is 100 feet square\* at base and about 165 feet high. The double story below the pyramid and immediately above the terrace basement is vertical, with five compartments or towers on each face (north, west and south) of the temple, separated by four deep recesses, with a handsome sculptured ornament (*purīṇa kumbam*) in each recess. Each projecting compartment has a fine sculptured figure, chiefly Śaiva but not without important Vaishnava figures, and the plain intervals of flat wall are covered with (?) historical scenes of rishis, kings, worshippers and attendants, celestial as well as terrestrial, in low relief.

Above the double vertical story rises the pyramidal *stubi* in seven stories to the neck which is spacious and supports four bulls (as at Tanjore) below the dome or semi-dome.

The whole temple is of stone throughout, and the domed top is apparently carved to represent a copper tile or leaf-pattern covering, like that of the five halls (*sabha*) at Chidambaram.

The only or chief ornament of the pyramidal portion of the tower is the square and oblong cells of “*Rath*” (= car) or *Gōpuram* (= spire-roofed) pattern, with their elaborate fan-shaped windows, like spread peacocks’ tails.

There is little if any stucco to be seen, the whole being of pure stone.

On the east side and attached to the great *stubi* is the *Mēle-Mandapam* (= a high court or west court), a three-storied portico or transept covering the cross aisle between the north and south entrances to the Temple; this is built to match the *Vimāna*, as at Tanjore.

To its east again and attached to it, is the west wall and end of the great Outer court (*Veli-mandapam*), begun in the same magnificent scale

\* See note above.

and style, but never completed : for it is broken down or left off rather abruptly, and finished by a plain large hall, completely enclosed by its four walls and flat roof, only half the height originally designed.

It measures 80 feet wide, North and South, and 163 feet long, West to East, with a plain doorway in the middle of the east end, having huge stone warders (*dwārapāl*), but otherwise devoid of any fine ornamentation. It is 18 or 20 feet in height, and the roof is supported by four rows of plain stone pillars.

There is a large uncovered and incomplete portico in front (East) of the Veli-mandapam, approached by a double flight of steps from North and South and 10 or 12 feet above ground level, which is the level of the interior of the mandap and temple.

The court-yard of the temple is about 610 feet East and West, by 350 feet North and South, with a fine gōpuram or entrance tower built entirely of stone (fast falling down) on the East, of grand but suitable proportions, not half the height of the temple itself. Usually the gōpuram is 8 or 10 times as high as the temple sanctuary.

The court-yard or quadrangle was once surrounded by a double-storied open cloister of plain but solid stone work, said to have contained 365 cells (in the two stories), but only a few of these remain in the centre of the north wall there is a small plain doorway.

The surrounding wall was of stone and must have been about 25 feet high.

The sculptures round the base of the temple are very good in design and execution.

The architecture struck me as grand, simple and pure, with many traces of the wooden construction of which it is, in many respects, a copy ; especially in the projecting beam-heads at the angles, each of which is surmounted by a rude lump roughly resembling a flattened spiral (conch-) shell, perhaps intended for the śālagrām (black ammonite or serpent-stone) ; only this is a Śaiva temple.

I did not notice the Nāga, but saw traces of trees with umbrellas over them.

The (proper) right hand Dwārapāl has the right foot raised and resting on a stump (of a tree), encircled by a serpent with a half-swallowed elephant in its mouth, at all three doorways alike.

The projecting stone cornice of single convex flexure is massive, but does not stand out so far as in many more modern cases I have noticed elsewhere, but is, I should say, more free and prominent than some to be seen at Chidambaram.

I did not see the imitation of wooden rafters and laths, with nail heads &c., to be seen at Tinnevely.

The usual Bull (*Nandi*) in front of the temple is a poor one, compared with that at Tanjore.

The minor temples and shrines in the court-yard are inferior and mostly in ruins.

One of the more conspicuous of the sculptures represents Śiva coming out of an opening (*yóni* or split) in a cylindrical stone column (or *lingam*).

This figure is represented at Tanjore and elsewhere, and is to be seen repeated here several times in various parts of the Gangaikouṇḍa Sholapuram temples.

A figure of a rishi (Mārkaṇḍa) on his knees, with forehead on the ground, is below.

The pillars and pilasters are very plain, square in the four towers (or *rath*-like portions), forming the four corners of the *stūbi*, ornamented by pointed leaves below the capitals, which are very fine large tabular slabs.

The square pillars or pilasters are not cut away to the octagon form leaving square blocks, as is common. The pillars and pilasters of the next, intermediate, partitions or towers are octagon throughout, with similar lanceolate ornamentation and (octagonal) capitals.

The central partitions or towers have 16-gonal pillars and pilasters with similar ornaments and capitals.

The plinth moulding is very grand, bold and chaste. It recalled to my mind the pattern of the plinth moulding of an unfinished temple at Kuttálam (*Courtallam*) in Tinnevely.

The flat portions of the walls are covered with (?) historical scenes in which rishis and country folk, herdsmen &c, figure largely.

There are three or four wells in the Temple court, one of which (the Sin(g)ha Tīrtham) is connected with the legend of the founding of the temple and possesses a never-failing supply of very good water.

I noticed that the name on the Tanil inscriptions was Gangaikouṇḍa Sholapuram and Gangaikouṇḍapuram. The inhabitants now call it Gangaikandapuram. They told me that the Stalapurāna or local historical record of Gangaikouṇḍapuram had been taken to Tanjore and a copy placed in the Rajah's library there, whilst a copy (or the original) was taken and kept by the copyist who now resides at Nachaiyárkóvil (or at Tirichirai) near Kumbakónam.

Another place of interest I visited may be worth mentioning though quite modern, and that is Rámalinga-pillai-súlai, a remarkable church or college building, called variously *Pardésimaḍam*, and *Sanmúrga-Sabai*, situate on the high road from "Cuddalore" to Vriddhāchalam, a mile or

so west of the point where the high road from Madras (viâ Panrutti) to Kumbakónam crosses it.

A few years since, one Rámalingapillai collected followers and money and attempted to establish a new religion. He appears to have taught the ethics of Christianity without its theology. But I could not get at any precise particulars. Having collected some hundreds of followers (2000 was stated) and built his college, Rámalingapillai retired with some ceremony into concealment in a house, now styled "*Tirumáligai*," in the village of Mottukuppam, a few miles distant from the College.

He is said, by his followers who now await his re-appearance at "the last day," to have never come forth from the room in which he disappeared, or to have been seen again.

I think the true facts of the case are worth eliciting and putting on record. The building is a remarkable one of brick and *chunam* in the modern Eurasian composite style, and the domed part of the roof or cupola appears to be covered with sheet metal.

I also visited Chenji or Sanji-Kóttai (Anglice *Gingee*), a remarkable precipitous bluff rock, covered with and surrounded by fortifications of no very ancient date apparently. It is just the kind of stronghold that was likely to be seized on and held as a citadel by the successive conquering armies that have overrun the Carnátik for some centuries past.

The most interesting thing I observed here, beside the natural fastness (a notice of which is to be found in the *South Arcot Gazetteer*), was a very rudely carved stone lying in front of a small shrine halfway up the rock on the south side, dedicated to a local goddess called Kamala-kanni-y-anman to whom human sacrifices were formerly offered. Plate I shows copy of a rough pencil sketch taken hurriedly on the spot. Four human heads occupy a square raised shield, with two parallel bars in the centre like a pair of dumbbells with small knobs, which might stand for footprints. Each pair of heads is separated by a *triṣul*-like mark immediately above and below the pair of bars in the centre. Above these in the centre at top is a pair of ram's (?) horns, surmounted by a short transverse bar and appendage which I could not make out, and in the centre below, a corresponding pair of buffalo (? *kulḡá*), horns and head. A bow to the right and five arrows to the left on the lower part of the stone, at each side of the raised part, complete the carving. The arrows are club-headed and feathered, and one of them is furnished with a hole at one end, as if to hold a line. The entire stone is an oblate circle about 3½ feet high and 4½ feet wide, and not very thick, lying flat on the ground. Close to it is an upright figure of "Minudaiyan Virappan," with hands together in the attitude of respect or supplication, and a sacrificial post stood near.

The *grām-munsif* said that this “kóvil” or chapel was held in great respect by the country-folk and was originally there before the present fortifications were built. Sacrifices are still made in times of drought and dearth and are supposed to be very efficacious.

The temples at the base of Chenji and some of the sculptures and remains are very interesting, extensive and well wrought, but apparently modern, though quite deserted and going to ruin. The monkey god Hanumán is to be seen in several places sculptured on the rocks.

Since the road was made which passes through part of the Chenji fortress, it has been frequently visited and despoiled of its sculptured treasures. I was informed that the fine columns which adorn the “Place” at Pondicherry were removed hence by stealth, by an enterprising Frenchman. But we need not grudge them, for they are appreciated highly where they are, instead of being neglected and lost sight of in the spot where they formerly lay.

Some very handsome sculptures have been removed and set up at Chittámúr, a few miles distant to the eastward, near a new temple built by a neighbouring chief.

The traditional founder of the fortress is said to be one Supálaka (or perhaps rather *Tupákala*) Náyak.

I may here mention that the Stalapurána of Senji-Kóttai was stated to have been taken away by the Collector of the District (S. Arcot), a few years ago, and never returned.

At Mailam (= *Mayúrastalam*) near Tindivanam, the Tamburán (or abbot) informed me that his temple was founded by King Jayamba or Jayambaga Mahárája, from the north, who also founded or built Senji-Kóttai. This old fellow is a very fine specimen of a man who never touches flesh or any cooked food, but lives on fruit and milk only. He has repaired and restored his temple and is now building a fine stone gópuram on which I was shown a sculpture of himself, in the style of an old bearded Rishi. He reminded me of the Tamburán (or abbot) of Tiru(p)panandál near Kumbakónam.

Another very interesting place I visited near Tindivanam is Perumukkal (“*Perumacóil*” of Orme and of the Indian Atlas, sheet No. 78). Perumukkal is the common pronunciation in the district. At the place itself it is called, and written also, Perumukkúl.

Like Senji-Kóttai it has been a fortified stronghold for some centuries. It has a fine large stone mandap on the summit and some small temples or shrines, but the ruins of some larger ones strew the summit, sides and base.

The rock is an isolated one of dark granitic boulders, very precipitous in most places. It is the last to the S. S. Eastward of the rocky masses that stud the plain of the Karnatik to the south-west of Madras.

I noticed stone circles at its eastern base, as well as at other stony places to the west and south-west, on both banks of the Ponnīyār (S. Pennār or Pinākini.)

Mr. Garstin in the S. Arcot District Manual gives Peru-múkal (=great travail), from a legend of Sítadévi having here given birth to twins. There are two villages near, called Nalmukkúl (or Nāmukkúl) and Palamukkúl, names having reference to the same legend. Mr. Garstin also mentions Jánikipéttai, and I may add Rānanáthapuram, all in the immediate vicinity. But the old Sanniyāsi or hermit sent for the stalapurāna (kept by an artizan in the neighbourhood) and wished to show me from it that the proper name of the hill is Mukkiyáhalam, and that it is therein styled Madhyakāsi (Middle Kasi) and is the scene of Rishi Válmíki's penance, death and burial. A ruined shrine attached to the mandap is pointed out as the spot where he was interred.

There are the remains of many fine sculptures here, destroyed by the Muslim, and many inscriptions on the base of the temples.

The fort was held and besieged repeatedly in the wars of the Karnátik in which much damage was done by the roundshot.

The following observation may be worthy of record.

At Gangaikondapuram the wells are said to have a perennial supply of good water near the surface, that fails not in the driest seasons; and at Chidambaram the same is said of the great tank in the temple enclosure. At Tiruvaḍi (A S. 79), close to Panrutti, I noticed in the bed of the Geḍilam or Garuḍanadi (the "*Cuddalore*" river) a natural spring or fountain of clear water, welling up with some violence in the midst of the muddy river-water. It is said to be perennial and to be as good as Kávéri water, whence it is locally called *Kollaḍattumólai* = *Kolladam* or "water-spring".

In connection with these I mention the artesian wells that have recently been opened at Pondicherry and suggest that the perennial supply at Gangaikondapuram, Chidambaram and Tiruvaḍi may be explained by there being at those places a connection with the water-bearing stratum which is the source of the artesian wells, underlying the extensive laterite beds of the *Cuddalore* or S. Arcot district. I have heard of other places, particularly near Villapuram on the South Indian Railway, where the subjacent springs have been tapped by the natives and the outflowing water long since utilized for irrigating their fields.

*Rude Megalithic Monuments in North Arcot.*—  
By LIEUT.-COLONEL R. B. BRANFILL. (With a Plate.)

I have just had an opportunity of visiting the disused *tomb-field* at Irulabanda Bápanattam, in the Palmanér taluk of North Arcot.

The tombs here are of unusual interest from the size, shape and arrangement of the slabs of which they are composed, and the rarity of their chief characteristic.

The usual kistvaen or megalithic sepulchral cell is enclosed by three concentric rings of upright stone slabs, each slab having its top rudely worked (chipped or hammer-dressed) into a semicircular or a rectangular shape, and set closely side by side alternately, the round-heads standing higher than the intermediate flat-heads by the amount of their semi-diameter, *i. e.*, the height of the rounded portion, so as to form a parapeted wall of rounded *merlons* with flat silled *embrasures*.

These walls or parapets rise in three concentric tiers on a slight mound or cairn, a foot or so above the general ground level.

The outer circle or tier consists of some 24 slabs, nearly 3 feet wide, half of them being semicircular at top and standing about 3 feet high, the whole forming a ring fence or enclosing wall about 30 feet in diameter.

The second tier has 16 slabs, 8 of them round-headed, rising to a height of 5 or 6 feet above the cairn or mound; the whole forming an intermediate ring-wall about 22 feet in diameter.

The third or inner wall is composed of four prominent round-topped slabs, 8 to 10 feet wide, and 12 or 15 feet high above the cairn, and 4 or 5 feet higher than the other four flat-headed slabs that stand between them and complete the inner ring, an octagon of some 16 feet in diameter, or rather a square of 12 to 15 feet, with the corners cut off.

The kistvaen or sepulchral chamber nearly fills up the internal space, the capstone or covering slab of which sometimes projects horizontally beyond the chamber below it, so as to fit closely to the four great round-headed slabs that enclose it, the 4 flat-headed corner stones being only about the same height as the capstone, and narrower than the others.

The only entrance to the interior was apparently intended to be solely by small holes broken in the two or three central slabs on the east front, and nearly opposite to the similar hole in the eastern wall-slab of the kist. There is a kind of antechamber or closed portico between the inner chamber and the inner enclosing wall, provided with a moveable shutter stone or slab.

The stone slabs used throughout are comparatively very thin, being, usually about 3 inches thick, and even the great capstones seldom exceed 6 inches.

The whole forms an imposing structure, and recalls the idea of a small citadel or fortification.

There are many examples, perhaps a score or more of this pattern, still partly standing, and about as many more of a very similar kind, only without the round-headed projections, all the slabs in each ring or tier being of the same height, about 7 feet above ground level, and completely hiding the enclosed kistyaen.

Dividing the tombs into three classes according to size, and counting the fallen and half buried, as well as those standing, there are 170 of the 1st or biggest, 210 of the 2nd, and 200 of the 3rd or smallest sort, a simple kist composed of slabs from 2 feet square and upwards, more or less buried in the earth, and without any enclosing walls or circle of stones remaining.

Most of the tombs in this *nekropolis* are much ruined and overgrown by jungle so that I suppose there may well have been many more than 600 tombs here, within a space 500 yards long and 300 wide. The interments have but a shallow covering of soil, sometimes less than one foot.

On excavating they were found to yield the usual sepulchral relics, except that iron weapons were very scarce or entirely absent, whilst the terracotta coffers were more abundant than in the similar tombs of Mysore. In one, a few ornamental beads, similar to some taken out of the Coorg tombs, were found lying near the remains of a human skull.

Some of the coffers, sepulchral troughs or trays, were ornamented with a chain ornament in festoons and furnished with projecting rings or loops and prominent hooks, as if to hang garlands on. Some were mere small flat oval troughs, whilst others ranged up to 4 feet long, 2 feet wide and high, and were furnished with four or five pairs of legs.

Perhaps however I need only further mention the chief novelty that struck me, and this may be no novelty to others.

Two or three Tamil letters were found scratched on a fragment of a little bowl. They seem to spell the words *saduma* or *chathum* or *chadud*; the final letter (? *m*) is very doubtful and may be intended for a terminal *d* or *t*, if that were admissible.

I have some rough notes and sketches of a few of the monuments, but had no leisure to explore further. A careful collection and close scrutiny of every fragment of the pottery (which is abundant and of the rude but antique and polished kind) would probably yield some valuable and curious information as to the habits, &c. of the tomb builders.

The locality has a bad character for being feverish and is in a very retired part of the country just above the Eastern Ghats.

The way to it lies through Chittúr and Palmanéri whence there is a good road for 15 miles to the S. W. to Baireddipalle, and thence a bridle path for 6 miles *via* Neilipatla to Bápanattam. The nearest name marked

on the old Indian Atlas, Sheet No. 78, is "Yerlabundah" (? Irala-rock). The Irala are the wild folk who roam the jungle in search of forest products and a free silvan life. During the rainy season some of them are said to dwell in these tombs, many of which would afford them perfect dwelling-houses, and the marks and relics of their recent occupation are to be seen frequently and unmistakably.

I know of but three or four other places where these peculiar rounded slabs are to be seen, but they will probably be found to be more common when looked for.

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*The Coins of the Mahārājahs of Kángra*.—By C. J. RODGERS.

(With a plate.)

Kángra is the name of a fort and town situated at the junction of two mountain streams which form a tributary of the Bías on its right bank ere it leaves the hills. The coins in the accompanying Plate II go by the name of Kángra coins now-a-days. But the rájahs whose coins they are were known in history by the name of the Rájahs of Trigartta, the country of the three rivers, the Rávi, Bías and Sutlej. The family of these Rájahs claims its descent from Susarma Chandra, governor of Multán at the time of the Mahábhá-rata. After the war was over they went to the hills for refuge and erected the fort of Kángra for their protection. The district under the Rájahs of Kángra seems to have been like all districts governed by such Rájahs in old unsettled times. Kángra was their mountain stronghold. The neighbouring district of Jalandhar was subject to them, and must have furnished a considerable portion of their revenue. So the Rájahs of Kángra would be known at that time as Rájahs of Jalandhar. Being of the lunar race they kept the title *Chandra* after their names.

The Indo-Scythians conquered the fort of Kángra. When Mahmúd conquered it "the genealogical roll of the Indo-Scythian princes of Kabul for sixty generations was found in the fortress of Nagarkot by Mahmúd's soldiers"\* (Kángra is known in the history of India by the name of *Nagarkot*). From this fact, and from the immense amount of wealth taken from Kángra by Mahmúd, General Cunningham infers that "Káng-ra must have belonged to the Rájahs of Kabul for several generations, and

\* General Cunningham's Archaeological Report, Vol. V, for 1872-3, p. 155. The General quotes Abu Rihán's statement as contained in Al Biruni. I may here state that I am indebted to this report for nearly all my facts concerning the Mahārājahs of Kángra and to General Cunningham for much valuable aid generously given when I began to collect the coins drawn in the plate.

that it was their chief stronghold in which they deposited their treasures.”\* Not only this, but General Cunningham thinks that the wealth accumulated in Kángra at that time consisted of the silver pieces of the Hindu Rájahs of Kabul which are even now found so plentifully throughout the Panjáb—the coins of Samanta Deva, Syalapati Deva, Bhím Deva and Khadavaya Deva.†

One fact bearing strongly on this view the General seems to have overlooked. All the coins of the Kángra Rájahs with some few rare exceptions are of the horseman type. Some are of the bull and horseman type, with the names of the Rájahs over the bulls. Nay more than this, the earliest Kángra coins bear the name of Samanta Deva over the bull. That they were coined in Kángra no one will doubt who will cast his eye over the coins of the Rájahs in the plate. I once attributed the first two coins to Susarma Chandra. But a careful examination of the letters together with the results of a comparison of the letters of other coins with these, has convinced me that they are the coins of Samanta Deva.

The list of names of the Rájahs of Kángra from Susarma Chandra down to the last Rájahs is of course obtainable. There is no reason for doubting its correctness. But as yet no coins have been found going further back than Prithví or Píthama to whom General Cunningham assigns the year 1330 A. D. This is an approximation only, but based on fair reasoning. Judging by the number of coins obtainable of any prince we may I think fairly infer the length of his reign. The fewness of the coins argues that the reign was short. Before Píthama I believe the coins of Samanta Deva were coined and used at Kángra. There are immense numbers of these coins found yearly in the Panjáb. Some of them have the horseman after the usual type, horse well shown and the whole body of the rider with letters on either side his head. The bull is well developed too and the name above it is generally legible. But the Kángra type of Samanta Deva, which the die-cutters of the mints of the Rájahs of Kángra seem to have slavishly adhered to, is unmistakable, after it is once studied and known. The other well drawn coins are probably those of the Kabul or some other mint.

We must not be surprised if the coins of all the Rájahs are not obtainable. The coins of Kashmír, though very abundant, have many kings unrepresented. The coins of Chumba a neighbouring state to Kángra bear only the names of a few Rájahs, although the list of kings numbers no less than 170 sovereigns. Coining seems to have always been considered the peculiar privilege of paramount sovereigns or of independent rulers. Bearing this in mind, we need not wonder if any hiatus occurs in the lists of

\* Ibid, p. 156.

† I have seen several hundreds of these coins this year.—C. J. R.

coins as compared with that of the Rájahs. Nor must we wonder if a small number of coins turns up bearing names of rulers to whom we cannot attribute any country. Jalandhar and Kángra must have been subject at different periods to Kashmír as well as Kabul and perhaps to Kanauj. General Cunningham gives the following list :—\*

Accessions.	Name in list.	Name on Coins.	REMARKS. <sup>d</sup>
1330.	Prithvi.	Pithama.	Contemporary of Fíroz.
1345.	Purva.	Apurvva.	
1360.	Rupa.	Rúpa.	
1375.	Sringara.	Singára.	
1390.	Megha.	Megha.	
1405.	Hari.	Hari.	
1420.	Karmṛga.	Karmma.	
1435.	Sansára.	Sansára.	} Brothers. Contemporary of Muhammad Sayid of Delhi, A. D. 1433—1446.
1450.	Devanga.	Avatára.	
1465.	Narendra.	Narendra.	There is <i>one</i> coin known of Devangu.
1480.	Suvira.	.....	
1495.	Prayaga.	.....	Died 1528, A. D.
1510.	Ráma.	Ráma.	
1528.	Dharmma.	Dharmma.	
1563.	Manikya.	.....	
1570.	Jaya.	.....	
1585.	Vridhdi.	.....	
1610.	Triloka.	Triloka.	
			Rebelled against Jahángir, 1619 A. D. Triloka was the last king who coined. There are 12 more names given in the list.

A little study of Plate II will show that the coins are of several kinds. The commonest is that which has a bull on the obverse, with the name of Rájah above the bull. The reverse in every case except one has on it what is intended for an image of the horseman and horse. But as a rule there are only the legless hind-quarters together with the thigh and boot of the rider visible. The one mark on nearly all of them is the *spear* the horseman carries. First of all fixing this and remembering that the spear is carried close behind the man's thigh, to the right should come the horse's head and to the left the hind-quarters. But in reality only portions come on the coin. The die must have been as large as the silver coins of Samanta Deva which are a little broader than a four-anna piece. The boot is in some cases fully visible. But the head of the horseman is nowhere to be found. The spear has a notch on it near the bottom and a flag at the top. So it was a regular lance. Whether the man wore armour or not we can't say.

These coins are found in considerable numbers not in Kángra itself, but in Ludiána, Jalandhar and Umritsur. Vast quantities of them, are how-

\* Vol. V, Archaeological Report, p. 152.

ever annually melted down and very soon there will be no more obtainable. Some of them may contain a very small amount of silver. It is very seldom I now meet with any in Umritsur. It is so with everything. I do not know what provision Government may be making to secure a cabinet of coins for the museums of the country. I believe no provision whatever is being made. A few private collectors are at work for their own cabinets which in the course of a few years will find their way to Europe. The coming generation will have to receive history on mere hearsay. The numismatic monuments are fast disappearing. The old Rājahs in many cases are known already only by name. No records are obtainable of them. One would think that before it is too late Government should interest itself in the matter. The British Museum is far richer in the coins of India than any Museum in India. This is a mistake. If India is to be for the Indians, it is a pity to export from the country all those mementoes of former things and dynasties. Patriotism and loyalty go hand in hand with us. It would surely be wise in our Government to create a love of country in the hearts of the people of India. We want something to displace the grasping and selfishness which everywhere show themselves. The historic remains which lie round about us are not understood, or are rather misunderstood and not valued. History is taught as a matter of dates and names and is useless. Museums are collections of odd things which are to the educated and uneducated alike voiceless. The teachers of history cannot read the coins which would add interest to their lessons.

Of all the provinces of India, the Panjāb has more historic associations than any other. From the time of Darius to that of the Empress of India, the Panjāb has been an arena on which great struggles have taken place. Yet the coin cabinet of the Lahore Museum is wretchedly poor. A few Græco-Bactrian coins, a few Indo-Scythian coins and a few odds and ends with the names attached to them of the persons who presented them (!) are all that are visible to the ordinary visitor. The curator, in whose charge are the valuable coins which are always kept under lock and key, is generally engaged during the day. So visitors passing through Lahore see next to nothing of what ought to be visible at all times. There is no catalogue of the coins, and many valuable ones have been already lost. This is again a mistake. It is exactly the same at Delhi, where the coins are all in a box !!

These remarks are made not in a captious spirit, but with a real desire to direct attention to the proper use of museums and provincial coin cabinets, and also with the hope that both be made more use of in the education of the people for whom the museums were built and with whose money they are supported.

I will now proceed to make a few notes on the coins represented in Plate II.

No. 1. is a coin of Samanta Deva. Obverse above bull *Srī Sam*: reverse horseman.

No. 2. is a coin of the same prince, with *Srī Samanta* above bull, reverse horseman.

No. 3. *Pīthama*. Obverse *Srī Pīthama Chandra* (Deva), reverse horseman.

No. 4. Ditto Obv. ditto., rev. do.

No. 5. Ditto. Obv. ditto., rev. do. Horse's neck ornaments shown and whole leg with pointed boot.

No. 6. *Apurvva*. Obv. Maharajah *Srī Apurvva Chandra* (Deva), rev. horseman plain and horse's eye visible.

No. 7. Ditto. Obv. *Srī Apu(rvva) Chandra Deva* Maharajah, reverse horseman.

No. 8. Ditto. Obv. *Srī Apurvva Chandra*, rev. horseman.

No. 9. Ditto. Obv. (*Srī Apu*)rvva Cha(ndra) Deva, rev. horseman.

No. 10. Ditto. Obv. bull, above which *Srī Apu(rvva)*, rev. horseman.

No. 11. *Rupa*. Obv. bull, above which *Srī Rupa Cha(ndra)*, rev. horseman.

No. 12. Obv. bull, above which *Srī Rupa Chandra*, rev. horseman. The horses of Nos. 10, 11 and 12, have beads round their necks.

No. 13. *Apurvva*. Obv. (*Apurvva*) Chandra Deva Maha(rajah), rev. horseman.

No. 14. *Singāra*. Obv. Mahārājāh *Srī Singāra Chandra Deva*, rev, horseman. Very poor.

No. 15. *Megha*. Obv. Maharajah *Srī Megha Chandra Deva*, rev. horseman.

No. 16. *Hari*. Obv. Maharajah *Srī Hari Chandra Deva*, rev. horseman. Neck ornaments and eye of horse visible.\*

No. 17. Ditto. Obv. Mahārājāh *Srī Hari Cha(ndra Deva)*. The letters of the first line are all suspended from one line drawn across the coin as in Hindu letters. Rev. horseman. Head of horse, very much deteriorated.

(This king Hari soon after his accession tumbled into a well while out hunting. He was rescued after an interval of several days had elapsed. In that

\* Since I wrote this article I have come across a coin of Hari हरि. The coin in the paper is of Hari हरि. Now in conversing a few days ago with General Cunningham on this matter I said that I was inclined to ascribe this rare coin to the king who was the brother of Karmma and who was hidden in a well for some days. He quite agreed with me. The coins of the paper which as I say are found in great numbers, would then resolve themselves into the coins of the king Hari who lived after Triloka, A. D. 1630-50, whose coins those of Hari resemble in make and letters.

interval however he was accounted dead : his brother ascended the throne, and his wives mounted the funeral pile. When he came back he found Karmma reigning, and he went and took up his abode in the outskirts of his brother's dominions. I cannot account for Hari's coins being so plentiful. Out of several thousands I have seen, I have seen only one of Karmma, while at least one-fourth of the whole must have been Hari's. A Hari succeeded Triloka : perhaps these or at least some of them may be his coins although General Cunningham's list closes with Triloka.)

No. 18. *Karmma*. Obv. bull, above which Śrī Karmma, rev. horseman.

No. 19. *Sinsāra*. Obv. Śrī Sansāra Chandra Deva, rev. horseman with a large flag on which is a peculiar mark.

No. 20. *Avatāra*. Obv. Maharajah Sri Avatāra Chandra Deva, rev. horseman.

(There is one coin of Devanga, the *god-bodied*, known ; I gave one to General Cunningham.)

No. 21. *Narendra*. Obv. Maharajah Śrī Narendra Chandra Deva, rev. horseman.

No. 22. *Dharmma*. Obv., in a square area which is surrounded by a circle of dots, Dharmma Chandra ; rev., in a circle surrounded with a circle of dots, Durgā Devī.

No. 23. *Triloka*. Obv. Maharajah Śrī Triloka Chandra Deva. All the lines have the letters suspended from one line going across the coin. This coin and No. 3. are alike in this matter. Rev. horseman.

No. 24. Ditto. Obv. ditto without lines, each letter separate, rev. horseman. Hinder part of leg and thigh visible and hind-quarters and legs of the horse.\*

The coins of Megha, Avatāra Karmma and Dharmma are very rare. "The coins of Rupa, Singāra, Sansāra and Narendra are rare. Those of Pithama, Apurvva, Triloka and Hari are common. The Kāngra types of Samanta Deva are very common."

\* Where the whole name is not on the coins, the part omitted is in brackets.



*Note on an Inscription found upon a stone lying near the ruins of a Masjid on Lanka Island, Wular Lake, Kashmir.*—By MAJOR H. S. JARRETT, B. S. C.\*

The inscription which is in Persian, is as follows:—

این بقعه چو بنیان فلک محکم باد  
مشهورترین زین در عالم باد  
شه زین عباد تادر و جشن کند  
پیوسته چو نارنج خودش خرم باد

May this edifice be as firm as the foundations of the heavens,

May it be the most renowned ornament of the universe,

As long as the monarch Zayn Ibád holds festival therein

May it be like the date of his own reign,—“happy.”

As is well-known the letters of the Arabic alphabet, like those of the Hebrew or Phenician and consequently of the Greek, are used as numerals, and the grouping of certain letters into a suitable word is frequently made to serve as a *memoria technica* among the Easterns to recall a date. In the above inscription, the numerical value of the letters in *khurram* (خرم happy) is 847 which is the year of the Hijra it is intended to record. This date is equivalent to A. D. 1443-4 during which Zayn-úl-Aâbidîn (the Zayn Ibád of the inscription—for both have the same meaning, *viz.*, ornament of the Adorers) ruled in Kashmir.

It may be interesting to glance cursorily over the events which preceded the accession of this prince from the period of the close of the last Hindu dynasty in the eleventh century of our era.

The Hindu history of that country has been discussed in a short Essay by Horace Hayman Wilson which will be found in the XVth Vol. of the Transactions of the Asiatic Society. He takes as his guide the first of the series of the Raja Tarangini, by Kalhan Pandit who commences his history with the fabulous ages and carries it down to the reign of Sangrama Deva the nephew of Didda Râni in Sâka 949 or A. D. 1027 approaching to what Wilson considers to be the Pandit's own time Saka 1070 or A. D. 1148. The next two works of the series, *viz.*, the Rajavali of Jonah Raja and the Sri Jaina Râja Tarangini of his pupil Sri Vara Pandit, continue the record to the accession of Fath Shâh, which Wilson places in A. H. 882, but is given by Muhammad Kâzam author of the Persian history of Kashmir, as in A. H. 897 (A. D. 1491-2).

\* [A rubbing of this inscription was sent to the Society by Mr. Arch. Constable. The stone bearing the inscription is apparently a slab of black slate, well polished and finished, and measures  $21\frac{1}{2}$  by 12 inches and  $2\frac{1}{2}$  inches thick. The rubbing was taken on the 22nd September, 1874. The inscription, as shown in the rubbing, contains several inaccuracies; thus in the 2nd line زین is wrongly spelled ذین; the 1st and 4th lines have جو instead of چو, two dots being omitted apparently for want of space. Ed.]

In the following survey I have followed the narrative of this last mentioned historian who calls himself the son of Khayr úz-Zamán and who commenced writing his history in the year 1147 A. H. (A. D. 1734-5) during the reign of Muhammad Sháh of Hindustán. His work follows the order of the Sanskrit and is divided into three periods, the first treating purely of the Hindu dynasties, the second of the Muhammadan, and the third of the subjugation of the country by the House of Timúr, with some concluding remarks on the features and curiosities of the country.

With the second period alone is this Note concerned, and the narrative is taken up at the accession of the last Hindu Rajah Sahdeo in A. H. 705 (A. D. 1305-6). During his reign occurred an irruption of the Turks under Zulju whose ravages left for generations the traces of his incursion. Forced to leave the country in the winter after a stay of eight months, the army, betrayed by guides, perished in the mountain snows. Many of the inhabitants of the country had fled in fear of their lives, some to Tibet, others, including Rajah Sahdeo, to Kishtwárah where he remained in hopes of some day recovering his crown. His General Rám Chand who had been among the fugitives returned to Kashmír with a refugee from Tibet named Rihjú to whom in former times he had accorded his protection. The country was now in a state of anarchy, each petty chief asserting his own independence. Rám Chand and his people occupied the fortress of Lár. Rihjú\* or Rinjú (for the name is indistinctly written) seeing his opportunity gathered a few followers round him, made himself master by stratagem, of Lár, put Rám Chand to death and took his family prisoners. He now (A. H. 725 A. D. 1321) openly assumed the sovereignty, married the daughter of Rám Chand and won to his side the son of that Chief by granting him the government of Lár and Tibet and appointing him to a high command in the army. Though Buddhism was nominally the prevailing religion at this time, the country was distracted by the dissensions of sectaries, whose hostile and contending claims to religious truth perplexed the inquirer dissatisfied with the national religion. Such an inquirer was Rájá Rinjú, who after much perturbation of spirits and constant prayer, was led by divine inspiration—so runs the simple narrative—to watch a Moslem at his devotions. He saw, admired and believed, and soon led his court and people to embrace the Muhammadan faith. This monarch died in A. H. 727, after a reign of a little more than two years and a half, and the ruins of a once noble alms-house and a splendid mosque attest his reverence for the faith of his adoption. His widow Kotahrinī† married Udayn Deo, brother of the last Rájá, who continued with his consort to carry on the government till the year A. H. 742, when he died. One of the Generals of the army coming

\* The Rájataranginí has the name Rinchan.

† In the Rájataranginí Kotah Rani.

of a royal stock, named Shahmír who, settling in Kashmír in the reign of Sahdeo as a merchant, had fast risen to place and power, now thought himself strong enough to marry the twice-widowed queen and to usurp the crown. She refused his overtures, but he made himself master of her person, and she was forced to yield a reluctant consent to the espousals. She, however, slew herself during the marriage festival and Shahmír now became undisputed master of the crown (A. H. 743 A. D. 1342-3) and assumed the title of Sultán Shams-u'd-dín. He died in 747 A. H. (A. D. 1346-7) leaving two sons, Jamshíd and Ali Sher.

The reign of Jamshíd was short. He was defeated and slain in battle by his brother who succeeded him in 748 under the title of Alá-u'd-dín.

Alá-ud-dín's rule of ten years is marked by no important event. He died in A. H. 748 (A. D. 1356-8) and was buried at Alá-u'd-dín-púra.

His son Shaháb-u'd-dín succeeded to the crown on the death of his father. He employed his energies in clearing the country of rebels and marauders, and annexed Pakli, Dantaur and the tract, called the Sawád Kabír, to the crown. He wrested Tibet from the ruler of Káshghar and ventured to march towards India, then ruled by Firúz Sháh. After a campaign in which the victory was with neither party, peace was concluded on these conditions that the country from Sirhind to Kashmír should appertain to Shaháb-u'd-dín, while all to the eastward should acknowledge the sovereignty of Firúz Sháh. Muhammad Azam\* notes with surprise that this fact, which he says is mentioned by many historians, is left unnoticed by the author of the *Tárikh-i-Firuz Sháhi*. I may add that it is equally omitted by Elphinstone. (A. H. 758, A. D. 1356-7.)

On his return to Kashmír, he built the capital of Shaháb-u'd-dín-púra of which now not a trace but the ruins of a mosque remain, and he destroyed the large idol temple at Bijárah.† In the year A. H. 778 (A. D. 1376-7) he died.

Ḳuṭb-ud-dín his brother succeeded him in A. H. 780 (A. D. 1378-9). He ruled with justice and moderation and was celebrated as a scholar and a poet. Ḳuṭb-ud-dín-púra commemorated his name and the metropolis of his kingdom. He died in A. H. 796 after a reign of sixteen years. During his time occurred the advent to the court of Sayyid Ali Hamadání, the sixteenth in direct descent from Ali-b-Abi-Tálib, the son-in-law of Muhammad. He was revered for his sanctity and eminent virtues, and his influence guided the counsels of the monarch. The Sayyid bestowed on him his own cap which Ḳuṭb-ud-dín wore in the royal crown. It is feigned that

\* His son Muhammad Aslam, who is the author of the History of Kashmír entitled the *Gohar-i Aálam* and has made considerable additions to his father's work, goes so far as to say that the conquests of Shahab-ud-dín were carried northwards beyond the Oxus and southwards beyond Lahore.

† Called also Bihárah or Bij Bihárah.

its efficacy secured the throne to the monarch's successors until the reign of Fatḥ Sháh who directed it to be buried with him, from which period dates the decline of the dynasty.

His son Sultán Sikandar, better known by the title of the Iconoclast from the number of idols he destroyed, assumed the sovereignty in A. H. 796 (A. D. 1393-4). During his reign, the rapid advance of Timúr on his march to India, induced Sikandar to conciliate the Tartar conqueror by despatching his son Sháhi Khán known afterwards as Zayn-u'l Aábidín to his court with presents and friendly letters. Timúr gratified by this conduct, left him in possession of his territory but detained Sháhi Khán in Samarkand which he never left until Timúr's death. Sikandar after a reign of twenty-five years and nine months, died in A. H. 822. A superb mosque which contained 372 columns, each 40 cubits in height and 6 in circumference, was begun and completed by him in the space of three years under the direction of two famous architects Khwajah Sudr-úd-dín Khorasáni, and Sayyid Muḥammad Nuristáni. To his piety was also owing the erection of the great mosque of Bijárah, and with the exception of the rattle of the royal kettle-drums, no profane music was permitted to disturb the austere tranquillity of his capital. Through his munificence the walls of the romantic gardens of Shalimar were extended as far as the Parganah of Phág and their stability was assured or blessed by the burial beneath their foundations of all the Hindu works that could be collected. As these treated either of idolatrous rites, astrology or history that was fabulous, they were considered by the monarch as condign objects for destruction.

He was succeeded by his son Ali who reigned but six years and nine months. This prince bent upon performing the pilgrimage to Mecca resigned his kingdom in A. H. 828 into the hands of his famous brother Zayn ul Aábidín and set out on his journey. A. H. 822. (A. D. 1419).

A. H. 828. (A. D. 1424-5.) Zayn ul Aábidín was noted early in life for his abilities. He employed the time he had spent in Samarkand in adding to his store of knowledge, and on his return to his country he brought with him a number of artificers, such as paper-makers, book-binders, carpet-weavers, saddlers and others to improve the industries of his own land. His brother Ali having reached the territory of his father-in-law the Jammu Chief, was persuaded by him to abandon his pilgrimage and resume his sovereignty. Returning therefore with an army, he was met by his brother Zayn ul Aábidín, who gave him battle, defeated him and placed him in confinement wherein he shortly after died. The powerful faction of the Gurjis who in the time of his father possessed great influence in state affairs, and who favoured the cause of his brother, was exterminated by him, at Naushahr, at which place he erected a place for his own residence.

His time was now spent in promoting the prosperity of his country

and in repairing the ravages of the irruption of the Turks under Zulju which the lapse of more than a century had not yet been able to efface. He was a liberal patron of men of letters and encouraged the progress of the arts, especially favouring the artificers whom he had introduced from Samarkand. He travelled much over his dominions and his Hindu and Muhammadan subjects lived at peace with each other undisturbed by religious dissensions, which if they arose were amicably settled by punchajets at which the monarch himself would preside. This conduct gained for him the title of the Great King.

According to tradition in the vicinity of the Wular lake once stood a city of which the Rájá was Sudrasen. By reason of the enormity of his crimes, the waters of the lake rose and drowned him and his subjects. It was said that during the winter months, at low water, the ruins of a submerged idol temple might be seen rising from the lake. Zayn ul Aábidín constructed a spacious barge which he sank in the lake and upon which he laid a foundation of bricks and stones till it rose high enough to be level with the water. Upon this he erected a mosque and other buildings and gave the islet the name of Lanka. The expense of the work was defrayed by the fortunate discovery of two idols of solid gold which had been brought up from the lake by divers. On the completion of Lanka the king ordered a great festival to be held wherein great sums were distributed amongst the poor. Verses were written by the poets to commemorate this event, and among these the inscription under notice by Ahmad Allámah Kashmíri was engraved upon a stone and placed above the Mihráb or sanctuary of the mosque. This Ahmad Kashmíri was the author of the Núr-náma, a Persian translation made in the time of Zayn ul Aábidín of an ancient History of Kashmir in the Kashmirian language by Shaikh Nur-úd-dín Wali. His translation was made use of by Muhammad Aslam the son of Muhammad Aqzam, in amending the omissions of his father's History. Mention of the slab with its inscription is made by Muhammad Aqzam who gives a faithful transcript of the verses Muhammad Aslam states that he visited Lanka in 1167 A. H. (A. D. 1753) and observing the inscription carried it in his memory and records it in his work. His second line runs thus—

مشهور به زیب و زين در عالم باد

which shows that either his memory failed him or he was unable to decipher the line more correctly given by his father.

The further history of Zayn ul Aábidín it is perhaps unnecessary to record. He died in A. H. 880 (A. D. 1475) and was succeeded by his son Hydar Sháh. His tomb may still be seen below the Zayna Kadal, the fourth of the thirteen bridges that span the river Jhelam in its course through the valley of Kashmir.

*Coins of the Sunga or Mitra Dynasty, found near Rámanagar or Ahichhatra, the ancient Capital of North Panchála, in Rohilkhand:—the property of H. RIVETT-CARNAC, Esq., C. I. E., F. S. A., &c. Described by A. C. CARLLEYLE, of the Archæological Survey of India.*

(With a Plate.)

The great ruined site of *Ahichhatra*, the ancient capital of North Panchála and now known as *Rámanagar*, has of late been yielding a plentiful supply of the coins of the Sunga or Mitra dynasty. Mr. H. Rivett-Carnac has been so fortunate as to procure a considerable number and variety of these coins from that find-spot, and he kindly placed them in my hands for examination and identification.

The fact of so many coins of this dynasty having been found so far to the north-west from their proper capital city, Pushpapura (or Pataliputra), may perhaps be held to be a proof of the wide extent of their sway. While making some excavations at Bhuila, the site of the ancient city of Kapilavastu, in the Basti district, I obtained a considerable number (probably about a hundred) of the coins of the Mitras, dug newly from the soil, in deep excavations, while I was present on the spot; they were mostly of Agni Mitra and Indra Mitra, with a few of other later kings of this dynasty. These coins were mostly of small size; but the coins obtained by Mr. Rivett-Carnac, from Rámanagar, are mostly of the largest size, with three or four only of the smallest size.

About one hundred and ten of these coins, belonging to Mr. Rivett-Carnac, have passed through my hands; and of these, several bear names of kings which are either new, or of rare occurrence, such, for instance, as *Bhadraghosa*, *Phagáni-mitra*, *Surya-mitra*,\* and *Anu-mitra*,—besides several coins of *Bhúni-mitra*, which were already known. The most numerous coins were those of Bhúni-mitra, and the next numerous were those of Phaguni-mitra,—after whom, in the descending scale of number, followed Agni-mitra, Bhánu-mitra, Surya-mitra, Bhadra-ghosa and Indra-mitra; with also a very few, from other localities, of the later kings, whose coins are of quite a different type, such as *Vijaya-mitra*, *Jaya-mitra*, *Satya-mitra* and *Saya-mitra*.

From the numerical proportion in which the coins of various kings are found in a hoard, we can generally make a pretty good guess as to who were the earliest, and who the latest, of the series. Thus, the king of

\* [This name was at first read *Srayan-mitra* by the author. General A. Cunningham first suggested the true reading *Saya* or *Surya-mitra*; see *Proceedings As. Soc. Beng.*, January 1880; see also below p. 28, *Id.*]

whom the greatest number of coins are found in a hoard, may be accepted as being either the latest, or the contemporary king, of the dynasty, at the time when the hoard was buried or lost; while the king of whom the fewest and most worn coins are found may be accepted as the earliest, in point of time, of the series. But a similar numerical proportion of coins of different kings may, sometimes, also have been brought about by accidental circumstances; and therefore we must, in all cases, be guided by the older or later forms of the alphabetic characters, which appear in the legends on the coins.

But if we follow the rule enunciated above, in a general sense, with sufficient judgment and discrimination, we may apply it in the present case. Thus, as the coins of Bhūmi-mitra are the most numerous, in proportion, in the hoard found at Rāmanagar, we may suppose that he was the latest king of the dynasty, at the time when the hoard was buried, and that the hoard was buried during his reign.

In like manner, as the coins of Phaguni-mitra are the next in point of number, to those of Bhūmi-mitra,—or in fact nearly equalling them,—and were, at the same time, far in excess of the coins of any of the other kings, we may conclude that Phalguni-mitra, was the immediate predecessor of Bhūmi-mitra.

The coins of Agni-mitra and Bhānu-mitra follow next behind, in numerical proportion. But as the coins of these two kings are nearly equal in number, it becomes difficult to decide which of them was prior to the other. There is, however, one marked distinction about the coins of Bhānu-mitra and that is, that the central symbol, of the three symbols above the name, is always punched into the coin, with a square punch; and the symbol in this square punch-mark depression is generally a repetition of the raised symbol to the right of it; while on the coins of other kings, the central symbol is generally different from either of the other two. Now this central square punch-mark depression I have also found on a few coins of *Surya-mitra*, who, from the greater rareness of his coins and the rather more antique form of the alphabetic characters of the legend, I consider to have been a predecessor of Bhānu-mitra,—and from these two kings' coins having the square punch-marked depression in common, I should say that Bhānu-mitra must have been the immediate successor of *Sūrya-mitra*. Agni-mitra must therefore be of later date, and should probably follow immediately after Bhānu-mitra.

The coins of Bhadra-ghosa are the fewest and the most scarce of all. And the alphabetic characters of the legend, are of an older type than on any of the other coins, and more nearly approach the forms of the old Laṭ character of Aśoka. Moreover the large coins of Bhadra-ghosa are very much worn, so much so that the legend is blurred and indistinct.

But Mr. Rivett-Carnac has one most beautiful little coin of Bhadraghosa, of very small size, on which the legend is as clear and distinct as possible,—really wonderfully clear for such a small coin.

The occurrence of only one undoubted coin,—besides one doubtful one,—of Indra-mitra, in this collection, is somewhat puzzling to me,—because, from the style of the alphabetic characters on his coins, I do not think they are so ancient as those of some of the other kings; and I would be inclined to place him certainly after Agni-mitra. The only reason that I can offer for this comparative (and perhaps only apparent or local) scarceness of the coins of Indra-mitra, is that his reign may have been a short one, and either that his residence was in some different part of the country, or that the distribution of his coinage was partial. I did not find that the coins of Indra-mitra were any more scarce than those of other kings, among the coins of this dynasty which I obtained at Bhuila (Kapi-lavastu).

But, in the present case of the Rámanagar coins, I think there may be another way of accounting for this, probably merely temporary or local, scarceness of Indra-mitra's coins. I would suggest that Indra-mitra was the son and immediate successor of Bhúmi-mitra, and that the Rámanagar hoard was buried immediately after the death of Bhúmi-mitra, and in the early part of the first year of the reign of Indra-mitra. This would account for the plentifulness of Bhúmi-mitra's coins, and the scarceness of Indra-mitra's, in the Rámanagar find.

I will now give a list of those Mitra kings whose names have been in any way authenticated; and I will place them in the chronological order in which I think they should be placed; and opposite to the names of those of whom coins were found in the Rámanagar hoard, I will place the number of each found, respectively.

Initial Date.	Names of Kings.	Number of Coins found at Rámanagar.
B. C. 178.	Pushpamitra, .....	(None.)
	Bhadraghosa, .....	5
	Surya-mitra, .....	7
	Bhānu-mitra, .....	10
	Agni-mitra, .....	11
	Anu-mitra, .....	1
	Phaguni-mitra, .....	28
	Bhúmi-mitra, .....	34
	Indra-mitra, .....	1, certain. 1, doubtful.

I will now proceed to give a detailed description of the coins themselves, see Plate III.

### I.—BHADRAGHOSA.

1. Coin, very small.

*Obverse.*

A square depression, caused by a die, containing the legend, with three symbols above it,—Bodhi Tree, Linga, and Serpents.

*Legend*—Bhadraghosasa.

*Reverse.*

A curious dumpy figure, as broad as long, of Buddha standing teaching.

2. Coin, large.

*Obverse.* A square depression, containing the Legend, with three symbols above it.

*Legend*—Bhadraghosasa.

(Note.—The three symbols above the legend are, to the left a Bodhi Tree standing on a square base or in a square railing;—in the centre, a linga guarded by two serpents (Nágs) which rise up on each side of it—; to the right, two serpents intertwined, forming a circular knot in the centre, with their two heads extending out, right and left, above, and their two tails extending out, right and left, below. This same description will apply to all other coins bearing these symbols.)

*Reverse.*

Two objects, not distinct.

### II.—SURYA-MITRA.

3. Coin, middle-sized, pretty large.

*Obverse.*

In a square depression, the legend, with three symbols above it.

*Legend*—Surya-mitrassa.

*Symbols* above legend :—To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, a square punch-marked depression, containing a symbol, which appears to be composed of several snakes intertwined.

*Reverse.*

Device indistinct. (But, on another coin, it appears to be the symbol of Sangha with the Buddhist Wheel of the Law, below it.)

4. Coin same size as the former.

*Obverse.*

In a square depression, the legend below, with three symbols above it.

*Legend*—Surya-mitrassa.

*Symbols* above the legend:—To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, linga guarded by two serpents (Nágs) whose heads rise above it on each side.

*Reverse.*

Apparently the symbol of Sangha, with the 'Wheel of the Law of Buddha. (This was referred to, in describing the previous coin, the reverse of which is defaced.)

### III.—BHÁNU-MITRA.

5. Coin pretty large.

*Obverse.*

In a square depression, the legend below, with three symbols above it.

*Legend*—Bhānu-mitrāsa.

(Sometimes the last part of the name appears to be *mitrasa*.)

*Symbols*, above the legend. To the left, the Bodhi Tree, as before. To the right, two serpents intertwined, as before. In the centre, a square punch-mark depression, containing a symbol composed of four snakes intertwined, and forming a squarish shaped figure.

*Reverse.*

The symbol of Sangha surmounted by the Wheel of the Law of Buddha. But it is possible that it may be intended for a figure of the Sun (*Bhānu*) placed above a pedestal.

### IV.—AGNI-MITRA.

6. Coin, large.

*Obverse.*

In a square depression, the legend below, with three symbols above it.

*Legend*.—Agimitāsa.

*Symbols* above legend. To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, Linga, guarded by two serpents (Nágs), one on each side.

*Reverse.*

Figure of Buddha standing, with right hand raised, and rays radiating from his head. He stands on a Buddhist railing, between two trees.

7. Coin, middle-sized, rather small.\*

*Obverse.*

*Legend* and *symbols* the same as in the preceding.

*Reverse.*

Buddha standing, with right hand raised, and flames ascending from

\* [This is a mistake; coin No. 7 in the Plate is not one of Agni-mitra, but of Bhūmi-mitra, like No. 10. By a mischance the wrong coin seems to have been sent to be figured; En.]

his head and shoulders. He stands on a sort of ornamental pedestal, probably representing the Lotus.

V.—ANU-MITRA.

8. Coin, very small.

*Obverse.*

Surface of obverse of coin, concavely depressed. Legend in a line below. Three symbols in a line above.

*Legend*—Anu-mitasa.

*Symbols*, the same as on the coins of Agni-mitra.

*Reverse.*

A Buddhist Railing. Above it, a large round ball, surrounded by a circle of dots. On each side below, a small round ball, with a curved semi-circular figure below it, the concavity of the curve being turned downwards; these two latter symbols resemble in shape the later modified old Indian form of the letter "T", just preceding the Gupta period. I think the central symbol above (namely the round ball surrounded by a circle of dots) may be intended to represent the Sun.

VI.—PHAGUNI-MITRA.

9. Coin large.

In a square depression, the legend below, with three symbols above it.

*Legend*—Phaguni-mitasa.

*Symbols*, above the legend. To left, Bodhi Tree standing on a square pedestal. To right, two serpents intertwined. In centre, a Linga, with two serpents (Nāgs) twined round it, their hoods raised up on each side of it.

*Reverse.*

Buddha standing on a lotus, with a canopy over his head.

VII.—BHÚMI-MITRA.

10. Coin, large.

*Obverse.*

In a square depression, legend in one line below, with three symbols in a line above.

*Legend*—Bhúmi-mitasa.

*Symbols*, Bodhi Tree, Linga with serpents (Nāgs), and two serpents intertwined in a knot,—as on the coins of Phaguni-mitra and Agni-mitra.

*Reverse.*

Buddha standing between two trees, on a Buddhist Railing. Rays or flames ascend from the head of Buddha.

## VIII.—INDRA-MITRA.

11. Coin, rather small.

*Obverse.*

Legend and three symbols in a square depression, as on the other coins.

*Legend.*—Indra-mitasa.

*Symbols,* the same as on the two preceding coins.

*Reverse.*

A squat figure of Buddha, above a Buddhist Railing.

(*Note* :—The legend on some other coins of Indra-mitra, which I have seen, appeared to read simply as “Inda-mitasa,” while on a few it seemed to have the still more mutilated form of “Ida-mitasa.”

## SUPPLEMENTARY NOTE.

Since my Paper on the coins of the Sunga or Mitra Dynasty was forwarded to the Asiatic Society of Bengal, I have seen in the collection of Mr. Rivett-Carnac, another apparently unique coin of a king of this dynasty called *Ayu-mitra*, which I believe to be a new name. This king must have been one of the latest of the dynasty, as the letters of the legend belong to the later Gupta period.

*Description.*

Coin, round, middle sized, copper.

*Obverse.* Bull.

*Inscription,* underneath, A-yu mi-ta-sa.

*Reverse.* Apparently a Peacock and Palm-tree ?

The legend on this coin is clearly and distinctly just as I have given it above, and there can not be any doubt whatever about it. This coin therefore must not be confounded with the common, though similar, coins of *Saya-mitra*, with which I am well acquainted.

In order to complete the list, I may mention that I have heard from General Cunningham that he has a coin of a king of this Dynasty named *Dhruva-mitra*. But as I have not seen General Cunningham's coin and therefore I do not know its age, I can not tell where to place *Dhruva-mitra* in the line of succession. But no doubt General Cunningham will describe the coin himself.

With the sole exception of the last named king, I think I feel pretty certain of the place which the rest of the Mitra kings respectively should

occupy in the order of succession. We now know of fourteen kings of this dynasty, and I would place them as follows :—

- |                   |                   |
|-------------------|-------------------|
| 1. Pushpa-mitra.  | 8. Bhûmi-mitra.   |
| 2. Bhadraghosa.   | 9. Indra-mitra.   |
| 3. Surya-mitra.   | 10. Vijaya-mitra. |
| 4. Anu-mitra.     | 11. Satya-mitra.  |
| 5. Bhânu-mitra.   | 12. Saya-mitra.   |
| 6. Agni-mitra.    | 13. Ayu-mitra.    |
| 7. Phâguni-mitra. |                   |

The fourteenth king would be General Cunningham's Dhruva-mitra; but not having seen the coin, I can not tell in what position to place him.

Of course I have never seen any coin of Pushpa-mitra; but he is nevertheless sufficiently authenticated otherwise; but I have seen and examined coins of all the remaining twelve kings.

With regard to the name *Surya-mitra*, I may now state that I have since seen several other coins of this king, and that the result of my examination of these other and more perfect specimens is that the name must be read *Suya* or *Surya Mitra*; and in this I agree with General Cunningham. On most of these coins the name appears to read as *Suya*, with a dot (anuswara?) above the 'y'; but on at least one coin, the name reads clearly as *Surya*, the *repha* appearing quite plainly on the top of the *y*.

*Coins of Ghiás-ud-dín and Mu'az-ud-dín bin Sâm.*—By C. R. STÖLPNAGEL,

M. B. A. S.

(With a Plate.)

The extracts from the *Tabakát-i-Násirí* made by Sir Henry Elliot in his *History of India* contain but little information concerning Ghiás-ud-dín of Ghór, nor is this want of details much to be regretted except for the fact that the coins obtained hitherto generally join the name of this ruler with that of his younger brother Mu'az-ud-dín who is looked upon as the first Pathán king of Delhi. It is stated that when 'Alá-ud-dín Husain, surnamed Jehánsoz, ascended the throne of Fíróz-kóh, he imprisoned his two nephews Ghiás-ud-dín Muhammad Sâm and Mu'az-ud-dín Muhammad Sâm in a fort of Wabíristán, and settled an allowance for their maintenance. He took Ghazní, but did not make it his permanent residence. After his death he was succeeded by his son Sultán Saif-ud-dín. This king released the two

princes, his cousins, of whom Ghiás-ud-dín dwelt peacefully at Firoz-koh, taking service with the Sultán Saif-ud-dín, whereas the more adventurous Prince Mu'az-ud-dín proceeded to Bámián and there found employment under his uncle Fakhr-ud-dín Mas'úd. But when Ghiás-ud-dín succeeded to the throne of Ghór after Saif-ud-dín's tragical death, Fakhr-ud-dín instigated his nephew Mu'az-ud-dín to bestir himself and likewise acquire a regal position. The latter accordingly started in all haste to his brother's court where he was received in a friendly spirit. He served Ghiás-ud-dín one year, after which the countries of Kasr-kajúrán and Istiya, between Herat and Ghazní, were assigned to him; and at a subsequent period he obtained possession of the city Takínábád, specially noted as the largest town in the Garmsír. In 569 A. H. (1173 A. D.) Sultán Ghiás-ud-dín conquered the town of Ghazní, but returned to Ghór after placing his brother Mu'az-ud-dín upon the throne, who secured in addition the territories of Ghazní and the country round about in 570 A. H. In the third year after this time, Mu'az-ud-dín led his forces to Multán, and henceforth his history becomes merged in that of India. Of Sultán Ghiás-ud-dín scarcely anything more is known, but it should be remembered in his favour that, instead of getting his brother murdered, he treated him with the greatest kindness, and always associated his name with his own on the coins of the realm. Ghiás-ud-dín died at Herát in 599, and Mu'az-ud-dín was murdered by the Gakkars at Rohtak in 602 A. H.

Coins in the joint names of Ghiás-ud-dín and Mu'az-ud-dín have already been published by Mr. Edward Thomas in his "Chronicles of the Pathán Kings of Delhi," two of which are of gold and two of silver, the latter being engraved in the first plate and numbered one and two, the latter being identical with the one described by Wilson in the *Ariana Antiqua*, pl. XX, 29. I have lately acquired eight specimens of dirhems of these Ghorí brothers, all of them different from those already described. Of these, three are similar to No. 1, pl. I of Mr. Thomas's book; see Plate IV. They are of silver weighing, on an average, 74 grains and have their legends arranged in three concentric circles, the patronymic occupying the centre. The first, however, differs in this that the outer circle containing the date (597) is found in the *obverse* with the name and title of Ghiás-ud-dín, and not on the reverse as on Mr. Thomas's coin. I thought it at first just possible that the engraver might have committed a mistake, and changed the outer circles of the obverse and reverse, but such a supposition is unlikely from the transcript of the coin in the body of the book, which clearly shows that the date belongs to the reverse. Moreover it is totally immaterial on which side the date is actually placed, and it is actually found on the reverse together with Mu'az-ud-dín's name, on two of the coins described in the

sequel of this paper. Although the margins are both a little abraded, they can with ease be supplied from the next coin. I may, however, remark that this coin could not have contained the name of the month of the year, as there is not sufficient space for its insertion.

The following is the transcript :

Date 597.

*Obverse.*

\* \* \* الدرهم في \* \* سنة سبع وتسعين وخمس مائة First circle.

لا اله الا الله محمد رسول الله السلطان الاعظم Second circle.

غياث الدنيا و الدين ابو الفتح Third circle.

محمد بن سام Centre.

*Reverse.*

هو الزئ رسل رسوله بالهدى و دين الحق ليظهره \* \* \* First circle.

الناصر لدين الله السلطان المعظم معز Second circle.

الدنيا و الدين ابو المظفر Third circle.

محمد بن سام Centre.

The last two of the three coins with concentric inscriptions referred to above, differ from the first in this that they have the arrangement of date just as in the Thomas's pl. I, No. 1; *viz.*, the date (596) is placed on the reverse containing the name of Mu'az-ud-dín. The size, however, is smaller, and the letters less bold. The *Ariana Antiqua*, pl. XX, 35 is probably a similar coin to my two; but as Wilson, owing to the worn condition of the coin in his possession, was unable to describe it, I include it in this paper. The outer circle of the obverse contains the Súrah common to all Ghori coins; the second has half the Kalima, which is afterwards continued in the second circle of the reverse; and the third circle and centre show the names and titles of Ghiás-ud-dín. The reverse has in the first or marginal circle the place of mintage and the month and year in which the dirhem was struck. Part of the second and the third circles and the centre, like those of the obverse, contain the titles and names, but of Mu'az-ud-dín.

Ghazni, month Zi-ul-hajja, A. H. 596.

*Obverse.*

هو الزئ رسل رسوله بالهدى و دين الحق ليظهره على الدين كله ولو First circle.

كوة المشركون

لا اله الا الله الناصر لدين الله السلطان الاعظم	Second circle.
غياث الدنيا و الدين ابو الفتح	Third circle.
محمد بن سام	Centre.
<i>Reverse</i>	
ضرب هذا درهم في بلدة غزنه في ذى الحجه سنة ست وتسعين	First circle.
خمس مائة	
محمد رسول الله السلطان المعظم	Second circle.
ادنيا و الدين ابو المظفر	Third circle.
محمد بن سام	Centre.

The other five coins have never been described before, as far as I know, and are quite of a new type. They were obtained from an itinerant Kabuli who was very shy in speaking of the place where they had been originally procured; but as in his conversation he said that he had been in Ghazni and Kabul, and had lately come to Lahore by way of Jellalabad, it may be reasonably presumed that they were not found in the Panjáb, but in the Kabul valley, or perhaps in or near Ghazni. All of these coins are likewise binominal. The weight is between 56 and 79 grains. The area on either side is a square composed of double lines, with the inscription arranged in five lines. The enclosing margin is of course in four sections. It is bounded by double circles. The margins are partially abraded, but fortunately one coin is sufficiently well preserved and the following inscription can be therefore made out with accuracy :

Dates 597 and 598.

*Obverse.*

Area :—

لا اله الا الله

محمد رسول الله

السلطان الاعظم

غياث الدنيا و الدين

ابو الفتح محمد بن سام

Margin :— هو النبي رسل رسول الله بالهدى و دين الحق ليظهره على الدين كله

*Reverse*

Area :—

الناصر لدين الله

السلطان المعظم

معز الدنيا و

الدين ابو المظفر

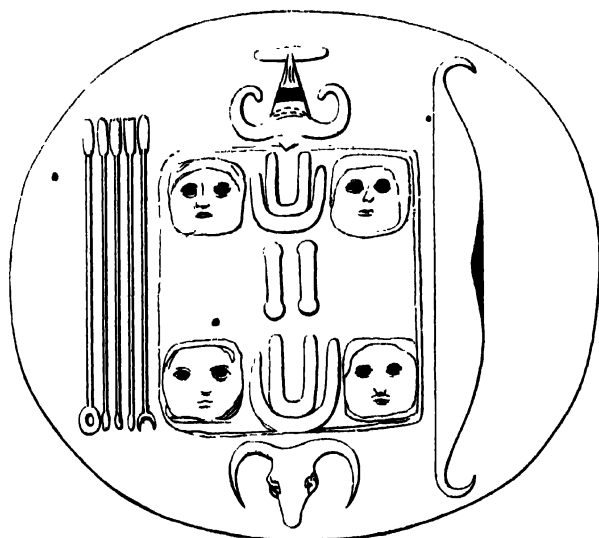
محمد بن سام

Margin :— ضرب هذا الدرهم في شهر سنة ثمان وتسعين و خمس مائة

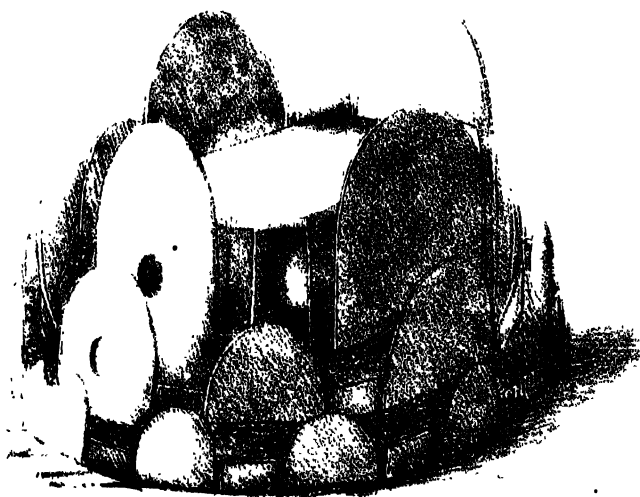
Of these five dirhems, four have the date on the reverse together with the name of Mu'az-ud-dín, and one on the obverse. None contains the place of mintage.

All these coins, bearing evidence to the joint rule of the two brothers, are dated 596, 597 and 598 A. H., and must have been issued towards the end of their reigns, for Ghiás-ud-dín died in 599 and his brother three years afterwards. Comparing the titles of the two sons of Bahá-ud-dín Sâm, the elder, Ghiás-ud-dín, is always called "ul'azam" the greatest, Sultán, ul nasr-l-dín illah and abúl fath, whereas to his younger brother are applied mu'azim, "great," Sultán, nasr-l-dín and abúl muzafr. It was only after the death of Ghiás-ud-dín that Mu'az-ud-dín called himself by the higher sounding title of 'azam.

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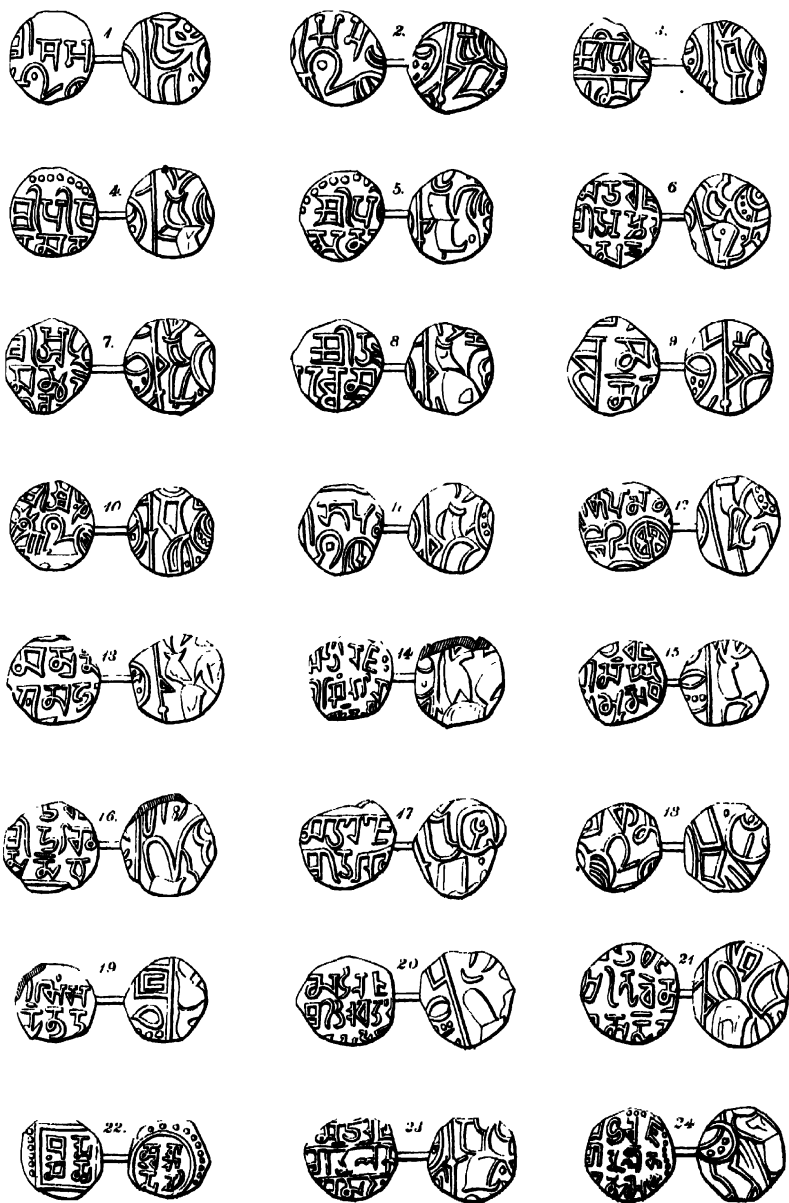


*Rudely sculptured (sacrificial) stone, lying before Temple of Kamala-kanni-yaminan at Chenji or Sankukhetta ("Ginge") S. Arcot.*



*Rude sepulchral monument of stone slabs at Irulabanda-Bipanattam, in North Arcot District of Madras Restored slightly.*

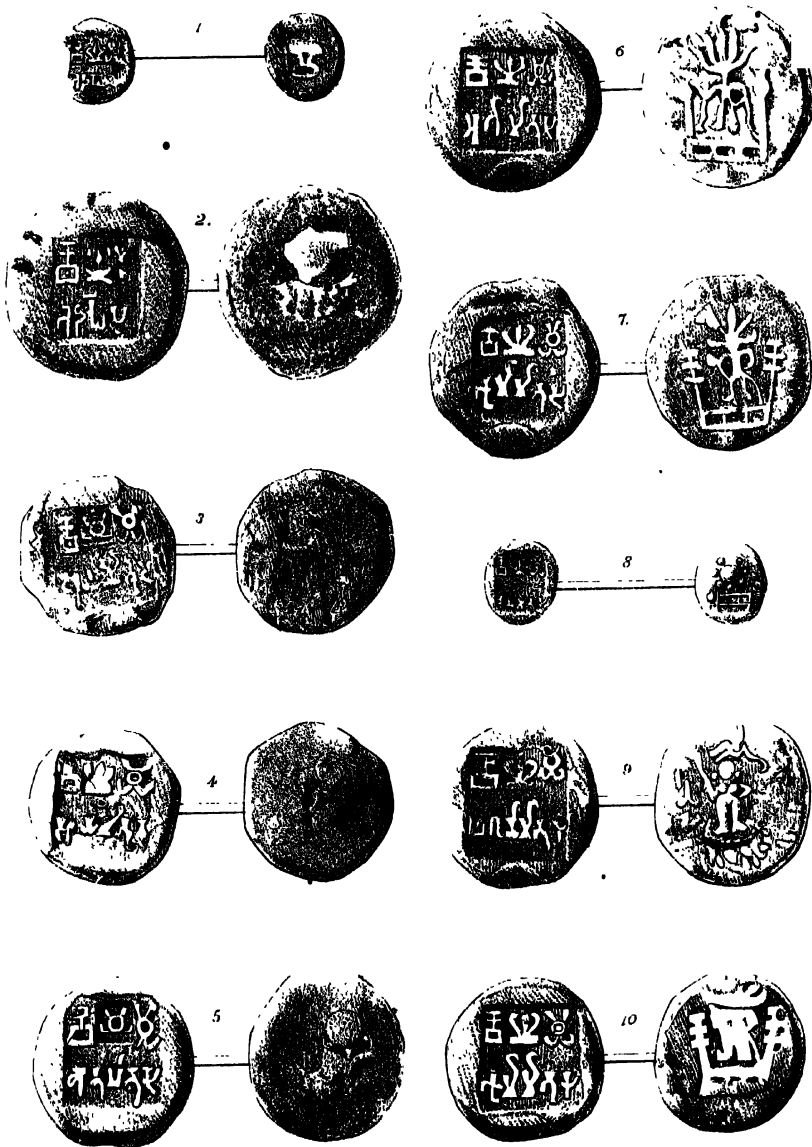




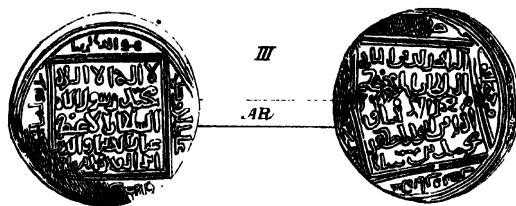
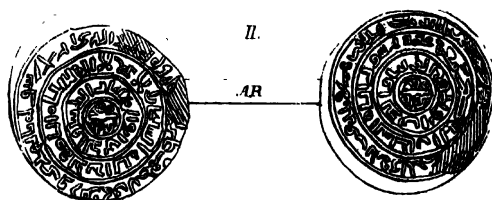
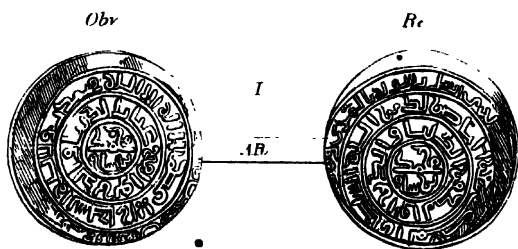
J. Rodgers del.

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# JOURNAL .

OF THE

## ASIATIC SOCIETY OF BENGAL.

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Part I.—HISTORY, LITERATURE, &c.

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No. II.—1880.

*A Collection of Hindí Roots, with Remarks on their Derivation and Classification.*—By DR. A. F. RUDOLF HOENLE.

This Collection was prepared by me some years ago and was originally intended to form part of my Comparative Grammar of the Gaudian Languages, and to illustrate the Chapter on Roots. The present introductory remarks give the substance of that chapter.

The Hindí, like any other language, possesses roots. By this term I here mean the constant element in any series of sense-related words. Thus in the Hindí words *bol-í* "speech," *bol-áhaṭ* "calling," *bol-uná* "speaking," *bol-á* "spoken," *bol-ai* "he speaks," &c. the constant element *bol* is the root; the remainder are suffixes and vary according to the meaning which is to be expressed by means of the root.

A root may be determined in Hindí, or for that matter in any Gaudian language, by detaching the suffix of the 3rd person singular present *ai* (or *e*) from the word, when the remainder will be the root. Thus in *bol-ai* "he speaks," *kar-ai* "he does," *bújh-ai* "he understands," *bol*, *kar* and *bújh* are the roots respectively.

For comparing Hindí roots with Sanskrit, this is the most convenient rule. For a large number of Hindí roots are not derived from the pure Sanskrit root, but from that modified form of it, which is confined to the present tense (or the so-called special tenses generally). Thus the Sanskrit root *budh* "understands," takes the form *budhga* in the present tense, whence arises the Hindí form *bújh*. From the Sanskrit *budh* comes the 3rd person sing. present *budhyate*, in Hindí *bújhai*; but from it comes also the participle future passive *boddhavya* "to be understood"; in Eastern Hindí this form is *bújhab* or *bujhib*, Western Hindí

*bújhibau*, which transliterated into Sanskrit would be *budhyitavya*. This shows that in Hindī the form *bújh* acts as a root, precisely as *budh* does in Sanskrit.

Putting aside mere phonetic differences, as in the Hindī *sikh* or *sikh*, Maráthī *śik* "learn," Eastern Hindī *char*, Western Hindī *chal* "walk," the Gaudīan languages differ very little with regard to their roots. There are, however, a few exceptional cases of roots which are confined to some particular Gaudīan language. Thus "see" is in Sindhī *pas*, Maráthī *páh*, but in Hindī *dis* or *dekh*, the Sanskrit *paś*, *preksh* and *dr̥ṣ*; again "come" is in Sindhī *ach*, Bangálí *áis* or *ás*, but in Hindī *áv* or *á*, the Sanskrit *ágachh* and *áyá*.

Roots, as a rule, do not undergo any change, when entering into conjunction with suffixes; except in the formation of the Causal Verb, in which case a long vowel is always shortened; thus *bol-áná* "to speak," but *bul-áná* "to call"; *chhoy-áná* "to loose," but *chhur-áná* "to cause to loose"; *ghúm-áná* "to turn," but *ghũm-áná* "to cause to turn"; *pí-ná* "to drink," but *pĩ-lúná* "to cause to drink", &c. There are, however, a few exceptional cases of changeable roots. These are *kar* "do," *dhar* "place," *já* "go," *le* "take," *de* "give," *mar* "die." These roots assume a considerably different form in the formation of the past participle and past tense; viz., the first five become *ka* or *ki*, *dha* or *dhi*, *ga* or *gi*, *la* or *li*, *da* or *di* respectively, and *mar* becomes *mu*. The regular, unchanged forms, however, also occur, and generally these three forms are peculiar to some one or other of the Hindī dialects. Thus the High Hindī has the past participle *ki-yá* "done," Eastern Hindī *ka-il* or *ka-yal*, but Western Hindī *kar-au*; Eastern Hindī also has the radical form *ki* in *ki-his* "he did," *ki-hin* "they did."\* So also High Hindī *mu-á* or *mar-á* "dead," Eastern Hindī *mu-il* or *mu-al*.

Roots, when determined as above explained, may be divided into two classes, primary and secondary. To the former class belong all those roots, the originals of which, though sometimes more or less disguised by subsequent phonetic modifications, exist in Sanskrit. Secondary roots are those, which have no Sanskrit original, though their origin can be traced to Sanskrit elements. Thus the Hindī root *kha* "eat" is a primary one; for its original is the Sanskrit root *khád*; but the Hindī root *paith* "enter" is secondary; for there is no Sanskrit root *pravishṭ*, though there is a Sanskrit participle *pravishṭa* "entered" (of the root *pra-viṣ*), from which it is derived.

Among the primary roots there are a few which have suffered no phonetic modification. Thus, the common root *chal* "walk"; W. H. *chalai*, H. H. *chale*, Skr. *chalati*, "he walks." (The E. H., however, has *charai*). But most of them have passed through some sort of phonetic

\* *h* is a euphonic insertion, for the sake of assimilation to *khi-is* "he took", *khi-in* "they took".

change. These changes are of seven kinds, of which sometimes one, sometimes several have affected the same root. They are—

1. Simple *phonetic permutation*, consisting in the elision or softening of a consonant, the contraction of adjacent vowels, and the like. *E. g.*, *khá* "eat," Skr. *kṛhád*; *chú* "leak," Skr. *chyut*;—*tar* "break," Skr. *troṭ* (causal of *truṭ*); *par* "fall," Skr. *pat*;—*paros* "distribute," Skr. *parivesh*; *ho* "be," Skr. *bhú* (*bhava*), &c.

2. *Incorporation of the "class-suffix,"* that is, the suffix, which in Sanskrit is inserted between the root and the personal endings, and according to which Sanskrit roots are divided into ten classes. In Hindí these suffixes are incorporated with the roots. Thus, *bújh* "understand," Skr. *budh* + *ya* (*budh* IVth class); *kop* "be angry," Skr. *kup* + *ya* (*kup* IVth); *nách* "dance," Skr. *nrít* + *ya* (*nrít* IVth); *sun* "hear," Skr. *ṣri* + *nu* (*ṣru* Vth); *bhanj* "break," Skr. *bhanaj* (*bhanj* VIIth); *ján* "know," Skr. *já* + *ná* (*jñá* IXth), &c.

3. *Incorporation of the passive suffix ya.* Thus, *lag* "belong," Skr. *lag* + *ya*; *sích* "irrigate," Skr. *sich-ya*; *de* "give," Skr. *dí* + *ya* (*dá*), &c.

4. *Change of "class."* In Sanskrit all roots are divided into ten classes, partly according to the various suffixes which some take before the personal endings in conjugation, partly according to internal phonetic changes which some undergo. The simplest roots are those of the Vth class; they are not subject to any internal change, but merely add the suffix *a*. In Hindí all roots alike are reduced to the simple form of the Vth class. This is done (*a*) by sometimes substituting the suffix *á* of the Vth class, for another suffix; or (*b*) by changing the final vowels of other class-suffixes (*u* in the Vth and VIIth classes, *á* in the IXth class) to *a*. Thus (*a*) *páva* "obtain" (Vth), Skr. *práp* + *nu* (Vth; as if it were *práp* + *a* Vth); *mánga* "ask" (Vth), Skr. *márg* + *aya* (Xth); again (*b*) *kara* "do" (Vth), Skr. *kar-u* (VIIth, *kṛi*); *jána* "know" (Vth), Skr. *já* + *ná* (IXth, *jñá*). That is, the Hindí roots *páv*, *mánga* (मंग), *kar*, *ján*, all of the Vth class, correspond to the Sanskrit roots *práp*, *márg*, *kṛi*, *jñá*, of the Vth, Xth, VIIth and IXth classes respectively, &c.

5. *Change of "voice."* Some Hindí roots are derived from the passive base of a Sanskrit root. Thus, *bhaj* "break" (active), Skr. *bhaj* + *ya* "be broken" (passive of *bhanj*); *de* "give," Skr. *dí-ya* "be given" (*dá*); *sak* "can," Skr. *sak* + *ya* (*sak*); *bik* "sell" (act. intrans.), Skr. *vikrí-ya* (*vikrí*), &c.

6. *Change of tense.* Some Hindí roots are derived from the future base of a Sanskrit root. Thus *dekh* "see," Skr. *drakshya* (future of *drīṣ*); (old H.) *nakh* or *nañkh* "destroy" or "throw away", Skr. *nañkshya* (future of *naṣ*); (old H.) *krakh* "draw", Skr. *krakshya* (future of *kṛish*); *khech* or *khaich* "draw," Skr. *krakshya* (future of *kṛish*).

7. *Addition of the pleonastic suffix api.* Thus *sukháv* "please," Skr. *sukh* (as if it were *sukhápi*). In causal roots this is the universal rule; e. g., *karáv* (or shortened *kará*) "cause to do," as if it were derived from a Sanskrit root *karápi* (instead of *kári*).

It will be observed that the laws 2 and 4, and again 3 and 5 are closely connected.

The preservation of a final single consonant (especially a hard consonant) in a Hindí root is a sure sign of its having been affected by the 3rd or 5th law. The final *g* of such a very common root as *lag* would not have been able to escape elision during its passage through Prákrit, unless it had been protected by another consonant following it; Skr. *lagati* "he belongs" would become Pr. *laai*, II. *lai*; but Skr. *lagyate* is Pr. *laggai*, II. *lagai* or *lage*.\*

The termination *aya* of Sanskrit roots (or rather bases) of the Xth class and of causals is contracted in Prákrit to *e*. This *e* is changed to *a* in Hindí, by the 1th law. Thus Skr. *márgaya* "ask" is Pr. *nagge*, II. *mánga* (मङ्ग); Skr. *trotaya* "break" is Pr. *tofe*, H. *toṛa*. On the same principle the Skr. *vikriya* "sell" (pass.), which in Pr. becomes *vikke*, is H. *bika*; thus Skr. *vikriyate* "it sells," Pr. *vikkei*, H. *bikai* or (contracted) *bike*.

Secondary roots may be divided into three sorts, according to the manner of their derivation; whence they may be called derivative, denominative and compound roots.

1. *Derivative roots* are those which are obtained by the *shortening of a radical vowel*. E. g., *nah* "flow" from *nahá* "bathe", Skr. *snú*. It will be observed that this process is the exact reverse of the well-known method by which Causals are formed in Sanskrit. These are made by *lengthening a radical vowel*; e. g., from the simple root *kar* "do" Sanskrit forms the causal root *kári* "cause to do," for which, by the 7th law, Hindí places *karáv* or *kará*. Now, mistaking *nahá*, which really is a simple root, to be a causal root (as if it meant "cause to flow"), Hindí re-derives from it a simple root *nah*; the pair of roots *nahá* and *nah* being, in outward appearance, exactly like the pair *kará* and *kar*.

2. *Denominative roots* are made by treating nouns, as if they were roots. The nouns which may be treated in this way are either substantives or participles. To the former class belong such roots as *jam* "germinate," derived from the Sanskrit substantive *janma* "birth" (of the Skr. root *jan* "be born"). Of the other kind are *pañh* "enter," derived from the

\* This process is expressly mentioned by Prákrit Grammarians, in the case of a few roots; as Pr. *rujjhai* (or *rubbhai*) act. "he hinders" as well as pass. "he is hindered," from Skr. pass. *rudhyate* "he is hindered," while the Skr. act. is *runaddhi* (VIIth cl.); see H. C. 4, 218, 245, 248. But it clearly occurred in more cases, than they recognized; thus, in all those cases enumerated in II. C. 4, 230. The case of the Hindí root *bhaj* "break" is exactly similar. See also S. Goldschmidt in J. G. O. Soc., Vol. XXIX, p. 492. and Weber *Saptarataka*, p. 64.

Sanskrit participle *pravishṭa* “entered” (of the Skr. root *pra-viṣ* “enter”); *baiṭh* “sit” and *pīṭh* “beat”, derived respectively from the Sanskrit participles *upaviṣṭa* “sitting” and *piṣṭa* “beaten” (of the Skr. roots *upaviṣ* and *piṣh*).\*

3. *Compound roots* consist of the Sanskrit root *kṛi* “do” or “make,” and some noun governed by it in the accusative case; in fact, they represent *phrases* in a contracted and much corrupted state. They can easily be recognized by their terminal consonant *k*, which alone remains of their original radical element *kṛi*. Thus *chuk* “cease” is derived from *chyuṭ* + *kṛi*, which is a compound of the Sanskrit noun *chyuṭ* “flowing away” and *kṛi* “make;” *e. g.*, the Skr. 3rd pers. sing. pres. *chyuṭ-kṛiyate*, lit., “he is made a flowing away,” is Pr. *chukkei*, H. *chukai* (or *chuke*) “he ceases.” Similarly *ruk* “stop” or “be hindered” comes from *ruṭ* + *kṛi*, *i. e.*, from the Sanskrit noun *rudh* “hindrance” and root *kṛi* “make;” again *kasuk* “be pained” or “suffer pain” from *kasham* + *kṛi*, *i. e.*, from the Skr. noun *kaṣha* “pain” + *kṛi* “make.” It is probable, I think, that the Prākṛit termination (3rd sing. pres.) *kei*, Hīndī *kui* or *ke*, is phonetically derived from the Sanskrit passive *kṛiyate* “he is made,” Skr. *ruṭ karoti* would mean “he makes a hindrance”; this phrase, being treated as a compound word, would form the passive *rukṛiyate*,† “he is made a hindrance” or “he is hindered,” whence would regularly arise the Prākṛit *rukkei*, and the Hīndī *rukai* or *rukke* “he is hindered.” Many of these compound roots are intransitive, which would naturally agree with their derivation from a Sanskrit passive root or base. Others which are transitive could, however, be no less easily derived in the same way, by the aid of the fifth of the above-mentioned laws, the “change of voice.”

By far the largest number of Hīndī roots can be brought under one or the other of the above-mentioned classes. Still there remains a small number of roots, the derivation of which, as yet, cannot be satisfactorily explained; *e. g.*, *ḍho* “carry,” *lauṭ* “return.” Even these, further research will probably show to belong to one of the two great classes.

The root *dekh* claims some special consideration on account of the controversy regarding its origin to which it has given rise. Various

\* Beames in his *Comp. Grammar*, Vol. III, p. 37 (footnote) says about me that “he discussed this as if it was his own discovery in *Indian Antiquary*, Vol. I, p. 357.” The word “if” is superfluous. The fact is, my article appeared in the December number of that *Journal* in 1872, and was written some months previously. Beames’ 1st Vol. appeared towards the end of that year, and I did not receive it till after some time in 1873; so that when I wrote the article, it was impossible for me to know, that my views had been anticipated by Beames; though, indeed, it may be questioned, whose the merit of the first discovery is, if such a matter can be dignified by that name. Moreover my theory has a much wider application than Beames’, as it includes nouns as well as participles.

† A mongrel form, no doubt, but nothing unusual in colloquial speech.

theories have been put forward,\* among which that of Childers is now probably more generally accepted than any other. Stated briefly, his theory, as first applied to the Pali root-form *dakkh*, is that this root is derived from the Sanskrit future base *drakshya* (Skr. *drakshyati* = Pāli *dakkhati*), its original future meaning having been forgotten in later times†. The theory, if true, must, of course, equally apply to the root in its Prākṛit and Gaudīan form *dekh*. In this form, however, it can hardly be directly connected with the future base. But there is, both in Prākṛit and Gaudīan, another very common root *pekh*, also meaning “see”. It appears to me most probable that the original form *dakh* was in course of time changed to *dekh*, in order to assimilate it to *pekh*.‡ The formation of such, more or less unintentional, assimilations is quite in keeping with the genius of vernacular languages. There are some very striking instances in Hindī. For example there is in E. Hindī the pair of roots *de* “give”, and *le* “take”, representing the Sanskrit roots *dā* and *labh*. The 3rd singular present are *dey*, *ley*, Pr. *dei*, *lei*; here *ley* and *lei* “he takes” are formed in assimilation to, or after the analogy of *dey* and *dei* “he gives”. Prākṛit has also the regular form *lahai* “he takes”, from Skr. *labhate*. Again the E. Hindī has the past participles *dihal* “given”, *lihal* “taken”; here *dihal* is formed after the analogy of *lihal*, from Prākṛit *lahida*. From the transitive pair of roots *pekh* and *dekh*, another, similarly assimilated, pair *pikh* and *dikh* is derived with, generally,§ an intransitive meaning “be seen”, “appear”. A more serious objection to Childers’ theory, in my mind, was the fact, that the origin assigned to

\* The whole subject of this controversy will be found briefly, but lucidly reviewed in Beames’ Comp. Grammar, Vol. III, pp. 45, 46. He does not mention, however, the ingenious theory of the two Goldschmidts (Paul and Siegfried), who explain *dekhkh* as a denominative root derived from the past participle *drishṭa*, by assuming the well-known modern pronunciation of श् *sh* as ख् *kh* to have already existed in Prākṛit; (see S. Goldschmidt’s *Prācṛtica*, pp. 6—8, and P. Goldschmidt’s *Essay in Göttinger Nachrichten*, 1874, pp. 518—520). But there is no evidence, really, of the existence of that usage in Prākṛit; moreover in the modern vernaculars, श् would not be pronounced ख्, when it stood first in a conjunct, but only when it stood singly or second in a conjunct: thus one might hear *purukh* (पुरुष) or *barkhā* (बर्षा), but not *jekkhṭh* (जिष्ठ, always *jeshṭh*).

† In Kuhn’s *Beiträge zur vergleichenden Sprachforschung*, Vol. VII, p. 450; also in a private letter to myself.

‡ Beames also was of this opinion in his Comp. Gr. Vol. I, p. 162, where he remarks: “it is perhaps worth notice that in scenic Prākṛit a very frequent word for ‘seeing’ is *pekhkh*, and that possibly the existence of this verb may have had some influence on the creation of the somewhat anomalous form *dekh*. The idea is based on the well-known fondness of the Indians for jingling words of similar sound.” He now appears to have abandoned it, in Vol. III, p. 46. But it cannot be dispensed with; so far at least, as the relation of the later *dekhkh* to the earlier *dakkh* is concerned.

§ In the old Hindī of Chand’s *Prithirāja Rāsau*, *dikh* and *pikh* are commonly used in a transitive sense (see, e. g., the verse on p. 39); also in modern Hindī occasionally.

*dekh* seemed to be an unique one. So far as I know, no parallel case of such a process of creation of a new root from the future base has hitherto been shown to exist. Quite lately, however, in my reading of Chand's Prithirāja Rasau, preparatory to my edition of it in the Bibliotheca Indica,\* I have come across two other striking instances of that process, so that I now incline to consider Childers' theory to be fully proved. For this reason, I have now† inserted it in the list of laws of formation of roots, above enumerated. Those two instances are the roots *nakkh* or *nañkh* "destroy" or "throw away" and *krakkh* "draw" or "pull." The former occurs, e. g., in the following verses :

बटकि तसचौ कर नषै ॥ (or नषै) 27, 88.

i. e. "impatiently he throws away his rosary with his hand"; again

हय सार मुषं निसंकंत नषै ॥ 27, 84.

i. e. "the chiefs of the cavalry he fearlessly destroyed."

The root *krakkh* occurs in the following lines :

बिना लज्ज पषै सचौ दुंढि पिथौ ।

सनौ डिंभरु जानिकौ मौन क्रथौ ॥

i. e. "unblushingly searching for a partner, Sachī (wife of Indra) espied him, and, like as the fish her young, so she drew him to herself."

Now the origin of these two curious roots finds a very easy explanation, by applying to them Childers' theory. The future of the root *naṣ* "perish" is in Sanskrit *nañkshyati*, which would be Pr. *nañkhaï* or *nakkhaï*, whence in Hindi *nañkhai* or *nakkhai* with meaning of the present. It is to be noted, that in Hindi the meaning of the root has become transitive (by the 5th law). Similarly the Sanskrit future of the root *kri* "draw" is *krakshyati*, Apābhraṃṣa Pr. *krakkhaï*, whence in Hindi, with meaning of present tense, *krakkhai*. It should be observed, that the rhyme in the above lines would require *krikhyau* or a root *krikkh*. This may serve to illustrate the process by which assimilations of radical forms are brought about in the vernaculars.

But further there is another well-known Hindi root, the origin of which, hitherto very puzzling, now finds an easy solution and thus serves as an additional confirmation of Childers' theory. This is the root *khech* or *khaich* or *kheṇch* (खेँच) or *khaiṇch* (खैँच) "draw." The Sanskrit conjunct *ksh* may change in Prākṛit to *kkh* or *chchh*; thus the Skr. root *preksh* "see" becomes *pekkh* or *pechchh* in Prākṛit; the Sanskrit future base *draṣhya*

\* Three fasciculi of this Epic have been published, one of the 1st Vol. by Mr. Beames, and two of the 2nd Vol. by myself; a fourth fasciculus (3rd of Vol. II) as well as an annotated English translation of the 1st fasc. of Vol. II will appear in the course of this year.

† It is not in the list given in my Comparative Grammar, pp. 161—171.

"will see" becomes *dakkha* or *dachchha* in Prākṛit (see H. C. 3, 171).<sup>\*</sup> Similarly the Sanskrit future base *krakshya* or *karkshya* would, in Prākṛit, become *kakkha* or *kachchha*; and the Sanskrit compound future base *ākarkshya* (of root *á* + *krish* "draw") would become *áakkha* or *áchchha*. With the insertion of the usual euphonic *y*, the latter would become *áyachchha*. The Prākṛit 3rd singular future accordingly might be *áyachchhai* or (with the not unusual nasalization instead of the reduplication of a consonant) *áyañchhai*; and, assuming Childers' theory to be true, this form might occur as a present, equivalent to the Sanskrit *karshati*. Now what I have thus constructed theoretically, is an actual fact, as testified by Hema Chandra in his Grammar (4, 187). He gives the following forms *áyañchhai*, *ayañchhai*, *áiñchhai*† as Prākṛit equivalents of the Skr. *karshati*. The last form *áiñchhai* (आइचइ) has arisen by contracting *ya* into *i*, and is that form which has immediately passed into Hindí, with this difference only, that *chh* has been disaspirated (a process not uncommon in the modern vernaculars). Hindí has *aichai* or *eichai* (ऐचै or ईचै). Now to return to *khech* and its compeers; the uncompounded root *krish* would yield a Prākṛit form *kachchhai* or *kañchhai*, which in Hindí, by transferring the lost aspiration of *chh* to *k* and by assimilation to *aichai* and *eichai*, would result in the modern forms *khaichai* or *kheichai* (खैचै or खेचै), or without nasalization, *khaichai* and *kheichai*. It will be observed that the later forms *kheichai* or *khaichai* are related to what would be the earlier forms *khañchhai* or *kañchhai*, just as the modern *dekhai* and Prākṛit *dekhhai* are to the Pāli *dakkhati*.

There are two other roots which also deserve a special word. One is the root *hokh* "be" or "become." It is an equivalent of the commoner root *ho* by the side of which it is very commonly used in Eastern Hindí. In Western Hindí, I believe, it is unknown. It is regularly conjugated, through all tenses. Its origin is obscure. I am inclined to look upon it as formed by the same (practically pleonastic) suffix *sk* which also occurs in such roots as *achchh* "be", *gachchh* "go", *yachchh* "hold", the element *sk* would change in Prākṛit either to *kchh* or to *chchh*; so that *bhāsk* (or *bhāvask*) would become Pr. *hokkh*, II. *hokh*, just as *ās* (of *ás*) becomes Pr. *achchh*, II. *achh*, or *gask* (of *gam*) becomes Pr. *gachchh*. Possibly—though I do not think it, probable—the origin of *dekh* might be accounted for in a similar way.

\* See also footnote on page 49. The Prākṛit word *sarichchha* "similar" exhibits the root-form *diechha*, which is to *dekh* (or *dikkh*), as *pechchh* is to *pekkh*. On the other hand its Sanskrit equivalent *sadṛīksha* exhibits the Prākṛit root *dekh* or *diechh* in its Sanskrit dress *ḍrīksh*, and is, I believe, the only instance of the admission of that mongrel Prākṛit root into Sanskrit.

† The MS. readings vary. H. C. also gives the forms *anuchchhai* and *ñachhai*; in the former the nasal has been transferred to fill up the hiatus, in the latter *ai* is contracted into *a*.

The other is the still more common root *áv* (or H. H. *á*) "come." Its origin has, I think, not yet been satisfactorily explained. One would naturally connect it with the Skr. root *á-yá*, from which, clearly the Maráthi root *ye* "come" is derived. But this does not explain the terminal consonant *v* in the Hindî *áv*. Now it is a curious fact, that the root *áv* imitates, in every respect, the conjugational forms of the root *páv* (Skr. *práp* = *pra-dp*),\* instead of those of the root *já* "go" (Skr. *yá*) which one would expect it to follow. Thus, present participle E. H. *ávai* or W. H. *ávatu* "coming," E. H. *párai* or W. H. *pávatu*\* "obtaining," but E. H. *jái* or W. H. *játu* "going;" past participle E. H. *áil* or *áyai* or *ávai*, W. H. *áyau* "come," E. H. *páil* or *páyai* or *pávai*, W. H. *páyau* "obtained," but E. H. *gáil* or *gayai* or *gayai*, W. H. *gayau* "gone;" 3rd sing. present H. *ávai*, H. H. *áve* "he comes," H. *pávai*, H. H. *páve* "he obtains," but H. *jái*, H. H. *jáe* "he goes." I incline, therefore, to think that there is here another instance of the, already noticed, tendency of the Indian Vernaculars to assimilate verbal forms, so that the *v* in *áv* is due to the influence of *páv*; an influence, natural enough, when it is remembered that *v*, equally with *y*, is often inserted between two adjacent vowels for the sake of euphony.† This assimilation is a very old one. There are traces of it in Prákrit as well as in the Gipsy dialects. In Prákrit there is the 3rd sing. pres. *áveṭ*,‡ and shortened *ávai* (H. C. 4, 367) "he comes." The regular Prákrit form would be *áái* or shortened *ái* (see H. C. 4, 240); but just as there is *utthai* or shortened *utthai* (H. C. 4, 17) for *utthái* or *utthái* (see Vr. 8, 25) "he stands up" (of root *ut-sthá*), so there might be *ái* or *ái* (of root *á-yá*), from which, by the insertion of the connecting consonant *v*, there would arise *ávei* and *ávai*.§

The following List of Hindî Roots is arranged alphabetically, in two parts. Part I contains primary roots, while Part II consists of secondary roots.

\* *Páyatu* in Kellogg's Hindi Grammar, p. 202, § 377, is a misprint.

† This influence of *páv* even intrudes occasionally into the conjugation of *já* "go"; thus the E. H. has sometimes *jáve* "gone," like *ávai*, *pávai*; and the 3rd sing. pres. *jáve* is rather common in H. H. beside *jái* or *jáye*.

‡ This form is quoted by Dr. R. Mitra from the *Pingala* in the Vocabulary appended to his edition of the *Sankshipta-sára*. I have not been able to verify it; but the form is not intrinsically improbable.

§ It is just possible to connect *áv* with the Skr. root *api-i*; thus 3rd sing. *apyeti* Pr. *appei* or *ápei* or *ávei* (cf. *kádum* "to do" for *kattum*). H. C. 4, 400 seems to refer it to Skr. *á-pad* (or better *á-pat*?). The Bangálí uses an altogether different root, *ais* or *ás*. Beames, in his Comparative Grammar (III, pp. 41, 45) rightly refers this root, as well as the Sindhi *ach*, to the Skr. root *á-gachh* (of *á-gam*). Disaspiration of an aspirate and pronunciation of *chh* as *s* are not uncommon in the Indian vernaculars (see my Comparative Grammar, §§ 11, 145, exc. 2). The root *á-gachh* would become in Pr. *áachh* (see Delius, *Radices Præcriticæ*, pp. 69, 70) or *áyachh*; by contraction in Bangálí, the former would become *ás* (for *áchh*), the latter *ái* (for *áchh*). The root *ais* might, however, be also referred to the Sanskrit root *á-vip*.

PART I.—*Primary Roots.\**

- 1 **राम्** *roam* = Skr. रम, Passive रमन्ते (with active sense), Pr. रमर (H. C. 4, 230), H. रमै.
- 2 **राम्** *resemble* = Skr. रम + ह, I. cl. रमन्तरति, Pr. रमन्तर (H. C. 4, 259 = Skr. रमन्तीभवति), E. H. रमन्तरै.
- 3 **आम्** *come*, see introductory remarks, p. 41.
- 4 **आम्** *feed* = Skr. आह, I. cl. आहरति, Pr. आहरर (H. C. 4, 259 = Skr. आदति), E. H. आहरै.
- 5 **उखाद्** *pluck up* = Skr. उत् खृष्, I. cl. उत्कर्षति, Pr. उत्कर्षर (H. C. 4, 187), H. उखाडै (with transfer of aspiration, as in खैचै, see p. 40 and my Comp. Gramm. § 132); see No. 28.
- 6 **उघाद्** *reveal* = Skr. उद्-घट्, X. cl. उद्घाटयति, Pr. उग्घाडे or VI. cl. उग्घाडर (H. C. 4, 33), H. उघाडै.
- 7 **उद्** *rise* = Skr. उत्-स्था, Passive उत्थीयते (with active sense), Pr. उठ्ठर (cf. E. M. p. 27 and Ls. p. 345, also उत्थेर) or VI. cl. उठ्ठर (H. C. 4, 17), H. उठै. In Pr. also VI. cl. उठ्ठावर or contr. उठ्ठार (Vr. 8, 26), in H. *deest*.
- 8 **उड्** *fly* = Skr. उड्-डी, IV. cl. उड्डीयते, Pr. उड्ठेर (Cw. p. 99, Spt. v. 223) or VI. cl. उड्ठर, H. उडै.
- 9 **उतर** *descend* = Skr. उत्-तृ, I. cl. उत्तरति, Pr. उत्तरर (H. C. 4, 339), H. उतरै.
- 10 **उथल्** intr. *upset, come off from, come down* = Skr. उत्-शल्, I. cl. उत्-शलति (उथलति), Pr. उथलर (H. C. 4, 174), H. उथलै.
- 11 **उथार** or **उथाल्** tr. *upset, take down* = Skr. उत्-शल्, Causal उत्-शालयति, Pr. उथालेर or VI. cl. उथालर, H. उथालै or उथारै.
- 12 **उपज्** *grow up* = Skr. उत्-पद्, IV. cl. उत्पद्यते, Pr. उपज्जर (cf. H. C. 3, 142), H. उपजै.
- 13 **उबल्** *boil* = Skr. उद्-बल्, I. cl. उड्बलति, Pr. उबलर, H. उबलै; cf. root बल्.
- 14 **उबार** *keep in reserve* = Skr. उद्-ह, Causal उद्धारयति, Pr. उब्बारेर or VI. cl. उब्बारर, H. उबारै.
- 15 **उमार** *raise up, excite* = Skr. उद्-भृ, Causal उद्भारयति, Pr. उम्बारेर or VI. cl. उम्बारर, H. उमारै.
- 16 **उरद्** or **उलद्** *grow up, also reprove* = Skr. उद्-लभ्, I. cl. उलभते, Pr. उल्लर (T. V. 3, 1. 133 = निस्सरति, H. C. 4, 259 has उल्लर), E. H. उररै, W. H. उल्लरै. In the sense "reprove" perhaps connected with उल्लय्?
- 17 **उहर** *subside* = Skr. अव-ह, I. cl. अवतरति, Pr. ओहरर (H. C. 4, 85 ओवरर, v. l. अहरर (with euphonic ह्), H. उहरै.
- 18 **ऊँच्** *be drowsy* = Skr. ? , Pr. उँवर (H. C. 4, 12 = निद्रायति), H. ऊँचै.

\* See List of Abbreviations at the end of this article.

- 19 कम् *be excited, raised up* = Skr. उद्-भू, I. cl. उद्भवति, Pr. उवभवद् (Vr. 8, 3) or उवभद् (cf. भति for भवति H. C. 4, 365), H. कम्; or denom. from ऊर्ध्व, Pr. उवभ, cf. H. C. 2, 59.
- 20 षोड् see secondary roots.
- 21 षोड् *burn* = Skr. षव-कुट्, IV. cl. षवकुट्यति, Pr. षोडद्, H. षोटे.
- 22 षोस *rot* = Skr. षप-वस्, I. cl. षपवसति, Pr. षववसद् or षोवसद्, H. षोसे (for\*षोडसे).
- 23 कर् do = Skr. कृ, VIII. cl. करोति, vedic also I. cl. करति, Pr. करद् (Vr. 8, 13), H. करै. In Pr. also X. cl. करेद् (H. C. 4, 337); Vedic also V. cl. हरोति, Pr. कुरद् (Vr. 8, 13), *deest* in H.
- 24 कस् *test* = Skr. कष्, I. cl. कषति, Pr. कसद्, H. कसे.
- 25 कस् *tighten* = Skr. कष्, I. cl. कर्षति, but also VI. cl. हवति, whence Pr. कसद्, H. कसे.
- 26 कस् *say* = Skr. कष्, X. cl. कषयति, Pr. कहेद् (Spt. v. 35) or VI. cl. कसद् (H. C. 4, 2. Cw. p. 99), H. कसे.
- 27 काट् *cut* = Skr. कृत्, Causal कर्तयति, Pr. कहेद् or VI. cl. कहरद्, (cf. 1. sg. कट्ते H. C. 4, 385), H. काटे.
- 28 काट् *draw* see secondary roots.
- 29 काप् or कप् *tremble* = Skr. कप्, I. cl. कप्यति, Pr. कपद् (H. C. 1, 30), H. कापै or कपै.
- 30 किन् or कौन् *buy* = Skr. क्री, IX. cl. क्रीणाति, Pr. किणद् (Vr. 8, 30) or किणद् (Dl. p. 22), H. किनै or कौनै.
- 31 कूट् *pound* = Skr. कुट्, X. cl. कुटयति, Pr. कुहेद् or VI. cl. कुहरद्, H. कूटे.
- 32 कूट् or कूद् *jump* = Skr. कुट् (or कूट्), I. cl. कुन्दते, Pr. कुन्दद्, H. कूंदै or कूदै.
- 33 कोड् or कोर् *scrape, dig* = Skr. कुट्, X. cl. कोटयते, Pr. कोडेद् or कोडद्, W. H. कोडै or E. H. कोरे.
- 34 कोप् *be angry* = Skr. कुप्, IV. cl. कुपयति, Pr. कुपद् (H. C. 4, 230), H. कोपै.
- 35 खप् *be expended, sold* = Skr. खप् (X. cl. or Causal of खि), Passive खयते, Pr. खपद्, H. खपै.
- 36 खा *eat* = Skr. खाद्, I. cl. खादति, Pr. खाखद् or (contracted) खाद् (H. C. 4, 228), H. खाप्\*.
- 37 खास् *cough* = Skr. कास्, I. cl. कासते, Pr. कासद् or खासद्, (cf. H. C. 1, 181, खासिन् = कासितं), H. खासे.
- 38 खिल् *be delighted, flower* = Skr. क्रीड्, Pass. क्रीयते, Pr. खिपुद् or खिलद् (cf. H. C. 4, 168 खेडु and 1, 382 खेज), H. खिलै.

\* In Prākṛit also the Passive खायते is used, apparently in an active sense; e. g. खज्जति "they eat" (Dl. p. 54, quoted from the Mṛcchhakatika; R. M. p. 87, seemingly quoting the same, gives खज्जदि).

- 39 **खीज** or **खीझ** *be vexed* = Skr. खिद्, VI. cl. खिन्दति; but also VII. cl. खिन्ने or IV. cl. खिद्यते, Pr. खिज्जर (H. C. 4, 224), H. खीजे or (corrupted) खीमे.
- 40 **खुल** *be opened* or *open* = Skr. खुद्, Passive खुयते, Pr. खुज्जर or खुजर, H. खुले. See Nos. 41, 44.\*
- 41 **खूट** *pluck* = Skr. खोट, Passive खोटते (actively), Pr. खुट्ट (H. C. 4, 116, said to be a substitute for Skr. तोडते of root तुड्), H. खूट.
- 42 **खेल** *play* = Skr. क्रीड् (cp. कौल् and खेल), I. cl. क्रीडति, Pr. खेज्जर (H. C. 4, 188) or खेज्जर (H. C. 4, 382), H. खेलै. (Pr. also कौलर Dl. p. 47).
- 43 **खो** *throw away, lose* = Skr. क्षिप्, VI. cl. क्षिपति, Pr. खिवद्, H. खोय (with खो for इव, see my Comp. Grammar, § 122).
- 44 **खोल** *open* = Skr. खुद् *divide*, X cl. खोडयति, Pr. खोडेड or VI. cl. खोडर or खोलर, H. खोलै. See Nos 40, 41.
- 45 **गढ** *tie* = Skr. गृथ्, IX. cl. गृथयति, also I. cl. ग्रन्थति, Pr. गंढर (H. C. 4, 120), H. गढै.
- 46 **गढ** or **गड्** *form, grave* = Skr. घट्, I. cl. घटते, Pr. गडर (H. C. 4, 112), II. गढै or गडै. See Nos 54, 59.
- 47 **गडाव** *form* = Skr. घट्, Caus. घाटयति, Pr. गडावेड or गडावर (H. C. 4, 340), H. गडावै.
- 48 **गन्** or **गिन्** *count* = Skr. गण्, X. cl. गणयति, Pr. गणेड (S. B. 11, 27) or VI. cl. गणर (H. C. 4, 358), H. गनै or (corr.) गिनै (see my Comp. Grammar § 35, note).
- 49 **गम्** *be spent* = Skr. गम्, Pass. गम्यते, Pr. गमर (Vr. 7, 9. 8, 58) H. गमै.
- 50 **गरिबाव** or **गलिबाव** *to abuse* = Skr. गर्ह् or गल्ह्, X. cl. गर्हयति, Pr. गरिहावर (cf. H. C. 2, 104) or गलिहावर, E. H. गरिबावै for गरिहावै.
- 51 **गल्** *melt* = Skr. गल्, I. cl. गलति, Pr. गलर (H. C. 4, 418), H. गलै.
- 52 **गच्** *seize* = Skr. ग्रह्, IX. cl. गृह्णाति, Pr. VI. cl. गेहर (Vr. 8, 15) or गंहर (T. V. 2, 4. 157), H. गहै.
- 53 **गा** *sing* = Skr. गे, I. cl. गायति, Pr. गावर or (contr.) गर (Vr. 8, 26), H. गाव्..
- 54 **गाड** or **गाड्** or E. H. **गार्ह** *form*; see secondary roots.
- 55 **गिर्** *full* = Skr. गृ, VI. cl. गिरति, Pr. गिरर, H. गिरे.
- 56 **गुच्** *thread* = Sk. गुफ्, VI. cl. गुफति. Pr. गुजर (H. C. 1, 236), H. गुचै.
- 57 **गाच्** *catch* = Skr. ग्रुच् (or ग्रुच), I. cl. ग्रुहति, Pr. गुचर, H. गोचै.
- 58 **वड** *decline* = Skr. वद् *depress*, Passive वद्यते, Pr. वडर, H. वडै.
- 59 **वड** *form, happen* = Skr. घट्, I. cl. घटते, Pr. वडर (H. C. 4, 112) H. वड. See Nos. 46, 54.

\* The roots खुल, खोल, खूट are all connected with one another and with the Sanskrit roots खोट, खोट, खोड, खोर, खोल, खुण्ड, खुड, खुर, कुर, which all mean 1, "limp," 2, "divide" or "break." The original form, apparently, is खोड or खर, or rather खुड.

- 60 वस् or विस *rub, be worn away* = Skr. वृष्, I. cl. वर्षति, Pr. VI. cl. वसर (= वृषति) or विसर (H. C. 4, 204, where it is said to be a substitute of वषति), H. वसे or विसै.
- 61 बाल *throw, destroy, mix* = Skr. बह्, I. cl. बहते, Pr. वजुर or बसर (H. C. 4, 334, T. V. 3, 4, 6 where it is said to be a substitute of वषति), H. बालै.
- 62 बुल् or बोल् *mix with a liquid, dissolve* = Skr. बूर् (also बुल् and बोल्), I. and VI. cl. बूर्णति (also बोणते, बुषति, बोलयति), Pr. बुलर or बोलर (Vr. 8, 6. H. C. 4, 117), H. बुलै or बोलै (see also Bs. III, p. 56).
- 63 बून *revolve* = Skr. बूर्, VI. cl. बूर्णति, Pr. बुसर (H. C. 4, 117), H. बूनै (also Bs. I, 344).
- 64 घेर *gather, surround* = Skr. गृह?; compare H. घर *house* with Skr. गृह.
- 65 बढ़ *mount, increase* = Skr. उद्-गृह्, VI. cl. उद्गृहति, Pr. (dropping उ) चडुर or चडुर (T. V. 3, 1. 128), H. चडै.\*
- 66 चप् *be abashed* = Skr. चप् *press*, Passive चप्यते, Pr. चप्पर (see H. C. 4, 395. चपिप्पर, T. V. 3, 4, 65. चपिप्पर), H. चपे. The transitive form is चाप् or चाप्.
- 67 चर् *graze* = Skr. चर्, I. cl. चरति, Pr. चरर, H. चरे.
- 68 चल or चाल *walk* = Skr. चल्, I. cl. चलति, Pr. चलर or चसर (H. C. 4, 231), H. चलै or चालै.
- 69 चव *drip* = Skr. चु, I. cl. चवते, Pr. चवर (H. C. 4, 233), H. चवै. See No. 74.
- 70 चाव *masticate* = Skr. चर्व, I. cl. चर्वति, Pr. चप्पर, H. चावै (see also Bs. III, 40.)
- 71 चिन्त् *think* = Skr. चिन्त्, X. cl. चिन्तयति, Pr. चिन्तेर (Spt. 156, H. C. 4, 265) or चिन्तर (H. C. 4, 422), H. चिन्ते.
- 72 चिन् *gather* = Skr. चि, V. cl. चिनोति, Pr. VI. cl. चिसर (Vr. 8, 29. H. C. 4, 241), H. चिनै.
- 73 चुन् *gather, choose* = Skr. चि, V. cl. चिनोति, Pr. VI. cl. चुसर (H. C. 4, 238), H. चुन.
- 74 लू *leak* = Skr. लुत् (or ल्युत्), I. cl. लोतति, Pr. लोसर or लुसर (H. C. 2, 77), H. लूर.

\* उद् + गृह् lit. *full upwards*, an unusual word in Skr., but formed exactly like the common compound उद् + पत्—The final दु of गृह् becomes ड् in Pr., see H. C. 4, 130 भाडर and Vr. 8, 51. H. C. 4, 219 रुडर. The initial उ is dropped, and the aspiration of ड् transferred to ड् or lost altogether, just as in the root बाह *desire*, from उद्बाह = उद्-बाह or from बाह् (see my Comp. Grammar § 132). In old H. the root is बह्; M. has both बह् and बड्; but G., S. and B. have बड्, which is the form given by H. C. 4, 206 (बडर). T. V. 3, 128 gives both बडुर and बडर.

- 75 चुम् *kiss* = Skr. चुम्, I. cl. चुम्बति, Pr. चुम्बर (Vr. 8, 71), H. चुम्ने.  
 76 छा *thatch* = Skr. छद्, X. cl. छादयति, Pr. छापर (cf. Dl. 54) or VI. cl. छापर (T. V. 2, 4. 110 or छापर in H. C. 4, 21) or छा (by contraction; cf. Vr. 8, 26), H. छाप्.  
 77 छिप् or चिप् or हुप् *be hidden* = Skr. छि *dwelt secretly*, Causal Passive छेयते, Pr. छेयद् or छिप्यद्, H. छिपै or (corr.) चिपै or हुपै.  
 78 छी or छीह् *touch* = Skr. छृम्, VI. cl. छृमति, Pr. छिह् or छिवद् (H. C. 4, 182), H. छीहै or छीवै. See No. 80.\*  
 79 छीज् *waste away* = Skr. छिद्, Passive छिद्यते, Pr. छिज्जद् (H. C. 4, 434), H. छीजै.  
 80 छू or छुह् *touch* = Skr. छुप्, VI. cl. छुपति, Pr. छुवर, H. छूरे or छूहै. See No. 78.  
 81 छूट् or छुट् *be released* = Skr. छुट् *cut*, Pass. छुट्यते, Pr. छुहद्, H. छूटे or छुहै.  
 82 छोड़् *release* = Skr. छुट् Causal छुटयति, Pr. छोड़े or VI. cl. छोडद्, H. छोड़ै (see also Bs. III, 52).  
 83 जन *give birth* = Skr. जन्, Causal जनयति, Pr. जणेर (Spt. 75) or VI. cl. जणद्, H. जनै. Skr. also IV. cl. जायते, Pr. जाणद् (H. C. 4, 136), H. deest.  
 84 जप् *recite* = Skr. जल्प, I. cl. जल्पति, Pr. जंपद् (Vr. 8, 24), H. जपद्.  
 85 जर *be feverish* = Skr. ज्वर्, I. cl. ज्वरति, Pr. जरद्, II. जरै.  
 86 जल् *burn* = Skr. ज्वल्, I. cl. ज्वलति, Pr. जलद् (H. C. 4, 365), H. जलै.  
 87 जा *go* = Skr. या, II. cl. याति, Pr. VI. cl. जाणद् or (contr.) जाड (H. C. 4, 240), II. जाय्.  
 88 जाग् or जागर *watch* = Skr. जागृ, II. cl. जागर्ति, Pr. I. cl. जागरद् and VI. cl. जग्यद् (H. C. 4, 80), H. जागरै or जागै.  
 89 जान् *know* = Skr. ज्ञा, IX. cl. जानाति, Pr. VI. cl. जाणद् (H. C. 4, 7), H. जानै, (also Bs. III, 41).  
 90 जी *live* = Skr. जीव्, I. cl. जीवति, Pr. जीवद् (H. C. 1, 101), H. जीरे.  
 91 जुम् *fight* = Skr. युष्, IV. cl. युध्यते, Pr. जुज्जद् (Vr. 8, 48), जुम् (also Bs. I, 328). In old H. also भुम्.

\* II. C. 4, 182 identifies the roots छिद् and छिह् with Skr. छृम्, for which he gives the Pr. Pass. छिप्यद् (H. C. 4, 257). The latter is merely a hardened form of छिह्, which would be the regular Pass. of छिवद् or rather of छिहद्. Now Skr. छृम् = Pr. छिह् or, on account of labial प्, = छुह् (see No. 80); again in Pr., छृ = भृ = बृ = व्य. Hence Skr. छृमते = Pr. \*छिह्यद् = \*छिह्यद् = छिप्यद्. It follows that the radical forms छिह् and छुह् (II. छी and छू) are derivative roots, made from the Passives छिह्य and छुह्य, and that the Skr. root छुप् is merely the Pr. root छुव in a Skr. dress (cf. Pr. पछ्यद् &c., and see S. Goldschmidt in J. G. O. S. 29, 493).

- 92 जुड् *be joined* = Skr. जुड्, Passive जुड्यते, Pr. जुहर, H. जुड़े; a very old secondary denominative root of युक्त p. p. of Skr. root युज्.
- 93 जोड् *join* = Skr. जुड्, X. cl. जोडयति, Pr. जोडेर् or VI. cl. जोडर्, H. जोड़े,
- 94 भाड् *argue, dispute* = Skr. भाड्, I. cl. भाडति, Pr. भाडर्, H. भाड़े. See No. 96.
- 95 भाड् or भाड् *fall off* = Skr. भड्, VI. cl. (भडति), Pr. भाडर् (H. C. 4, 180 for भडर्), H. भाड़े or भाड़े. See No. 97.
- 96 भाँड् *rush about* = Skr. भाड्, Passive भाड्यते (used in active sense), Pr. भाँडर् (H. C. 4, 161. for भाँडर्), H. भाँटे.\*
- 97 भाँड् *sweep off* = Skr. भड्, Causal भाडयति, Pr. भाडेर् or VI. cl. भाडर्, H. भाड़े. See No. 95.
- 98 भाल् *polish* = Skr. ज्वल् *shine* (?), Causal ज्वालयति, Pr. \*भालेर् or VI. cl. \*भालर्, H. भाले; cf. Skr. भस्मा *brilliancy*, भस्मा *flame*.
- 99 टक् or टक् *stitch* = Skr. टक्, I. cl. टक्कति, Pr. टक्कर्, H. टक्के or टक्के. Probably a compound root of छ.
- 100 टूड् or टूड् *break* = Skr. चुट्, VI. cl. चुटति, but also IV. cl. चुट्यति, Pr. तुहर (H. C. 4, 230) or टुहर (Pingal, as quoted by R. M. p. 99), H. टूटे or टूट.
- 101 ठग् *cheat* = Skr. स्थग्, I. cl. स्थगति, Pr. ठगर्, H. ठगे.
- 102 डार् or डाल् *throw away* = Skr. दृ *be scattered*, Causal दारयति, Pr. \*डारेर् or VI. cl. \*डारर्, II. डारे or डाले (cf. H. C. I, 217 डरो).
- 103 डाँस् or डास् or डस् *bite* = Skr. दंश्, I. cl. दंशति or दसति, Pr. डसर् (H. C. 1, 218) or डंसर्, II. डाँसे or डासे or डसे.
- 104 डोल् *swing* = Skr. डुल्, X. cl. दोलयति, Pr. दोलेर् (H. C. 4, 48) or डोलेर् (see H. C. 1, 217 डोला) or VI. cl. डोलर्, II. डोल.
- 105 ढक् *cover* = Skr. स्थग्, Pass. स्थग्यते (used actively), Pr. ढक्केर्, (Spt. A. 54 for ढग्गेर्) or VI. cl. ढक्कर् (H. C. 4, 21, where it

\* In B. this root is confounded with भाँड् "sweep." It is closely connected with the root भाड्, the original meaning of which is preserved in Marāṭhī "rush violently into contact with," and in the Hindī भाड् "quickly." Hence it comes to mean, on the one hand, "dispute, argue"; on the other hand, "become intermixed confusedly", "be entangled." With the latter meaning the root भाड् has been received into Sanskrit; from it comes the Skr. भाट "shrub," "underwood," the H. भाट or भाड. The original meaning it has preserved in the Skr. भाडति "quickly." The root may possibly be derived (as Bs. I, 177 says) from Skr. बधि+वड्, though the sense of "roam about very much" would be expressed rather by बति + वड्. But बधटति or Pass. बधट्यते (in act. senso) would regularly give Pr. बभटर् or बभटर् or (by elision of ब) भाटर् or भाडर्, whence modern भाटे or भाँटे. In the case of the root वड्, ड् does not change to ढ. (see H. C. 1, 196).

is said to be a substitute of डाद्), H. डकै. (See Wb. p. 43, 64, 67). Perhaps compound root of खग-क.

106 डाँच् *accuse* = Skr. ? Pr. डचर (H. C. 4, 118 where it is said to be a substitute for Skr. विहृत्), H. डाँचै. Perhaps a modification of डाँच्, No. 103.

107 डूक् *approach* = Skr. डोक्, I. cl. डोक्तते, Pr. डुकर, H. डूकै.

108 डूँच् *search* = Skr. डुँच्, VI. cl. डुणति, Pr. डुँडर, H. डूँडै.

109 तप् *burn* = Skr. तप्, I. cl. तपति, but also IV. cl. तप्यति, Pr. तप्पर (see H. C. 4, 140 संतप्पर), H. तपे.

110 तर् *cross* = Skr. तृ, I. cl. तरति, Pr. तरर (H. C. 4, 86), H. तरै.

111 ताक् *attend* = Skr. तर्क्, X. cl. तर्कयति, Pr. तक्केर (H. C. 4, 370) or VI. cl. तक्कर, H. ताकै.

112 तान् *stretch* = Skr. तन्, Causal तानयति, Pr. ताणेर or VI. cl. ताणर, H. तानै.

113 तार *save* = Skr. तृ *cross*, Causal तारयति, Pr. तारेर or VI. cl. तारर, H. तारै.

114 तुल् intrans. *weigh, be weighed* = Skr. तुल्, Passive तुल्यते, Pr. तुलर, H. तुलै.

115 तोड् or तोर *break* = Skr. जुट् *be torn*, Causal चोटयति, Pr. तोडेर or VI. cl. तोडर (see H. C. 4, 116, where however it is given as intrans.), W. H. तोड़े or E. H. तोरै.

116 तोल् or तोल *weigh* = Skr. तुल्, X. cl. तोलयति or I. cl. तोलति, Pr. तोलेर or तोलर (T. V. 2, 4. 97), H. तोलै or तोले.\*

117 थम् or थन् *be arrested, be supported* = Skr. खम्, I. cl. खम्भते, Pr. थम्भर, H. थम्भै or थन्भै See my Comp. Grammar § 120.

118 थाम or थान् or थान् or थम् *stop* = Skr. खम् *be firm*, Causal खम्भयति, Pr. थम्भेर or VI. cl. थम्भर, H. थामै, &c.

119 थोप् *pile, prop* = Skr. क्षुप्, IV. cl. क्षुप्यति, Pr. थुप्पर, H. थोपै.

120 दच् *be pressed down, be cowed* = Skr. दम्, Passive दम्यते, Pr. दम्भर or \*दम्भर, H. दचै (?)

121 दल् *split* = Skr. दल्, I. cl. दलति, Pr. दलर (H. C. 4, 176), H. दलै.

122 दह् intrans. *burn* = Skr. दह्, I. cl. दहति, Pr. दहर (Pingala, as quoted by R. M. p. 113; H. C. 2, 218 allows only डहर; but the root डह् does not occur in H), H. दहै.

123 दार *split* = Skr. दृ, Causal दारयति, Pr. दारेर or VI. cl. दारर, H. दारै.

\* H. C. 4, 25 gives Pr. तुलर; but the root तुल् in a trans. senso does not occur in H., though it is found in M. तुल् or तुळ्. In Skr. the root तुल् admits a X. cl. form तुलयति, from which the Pr. and M. trans. root तुल् is apparently derived.

- 124 दाह् trans. *burn* = Skr. दाह्, Causal दाहयति, Pr. दाहेर or VI. cl. दाहर, H. दाहै, see No. 122.
- 125 दिस् show = Skr. दिश्, VI. cl. दिशति, Pr. दिसर, H. दिसे.
- 126 दिस् or दौस् to appear = Skr. दृश् see, Passive दृश्यते, Pr. दिस्सर or दौसर (H. C. 3, 161), H. दिसे or दौसे.
- 127 दे give = Skr. दा, Passive दीयते (used actively), Pr. देर (Cw. p. 99, H. C. 4, 238), H. देय् or दे. In Pr. also VI. cl. दर (Spt. v. 2.6), H. deest.
- 128 देख् see = Skr. दृश्, Future दृश्यति (used in sense of present), Pr. देखर (H. C. 4, 181), H. देखै. See introductory remarks.\*
- 129 घर place or seize = Skr. छ, I. cl. धरति (*seize*) or धरते (*place*), Pr. धरह (H. C. 4, 234), H. धरै.
- 130 धंस् or धस sink, be pierced, run into = Skr. धंस्, I. cl. धंसते, Pr. धंसर or धसर (Pingala in R. M. p. 118, said to be a substitute for धावति), H. धंसे or धसै.
- 131 धार hold = Skr. ध, Causal धारयति. Pr. धरेर or VI. cl. धरह, H. धरै.
- 132 धो wash = Skr. धाव्, I. cl. धावति (or धू, VI. cl. धुवति), Pr. धोखर (Dl. p. 77) or (with euphonic व) धोवर, or धुवर (Spt. v. 133, 283) or धुवर (H. C. 4, 238), H. धोरे or धोवै.

\* The Skr. conjunct द्य may in Pr. become क्ख or क्ख. This will explain the origin of the synonyms of देखर, which are enumerated in H. C. 4, 181; viz., with क्ख are formed अवक्खर = Skr. अवदृश्यति (from root अव-दृश्); the same, contracted, becomes ओक्खर (with ओ for अव, see H. C. 1, 172); and the latter, expanded, becomes अवक्खर (with अव् for ओ, see my Comp. Gramm. § 48). With क्ख are formed अवयक्खर = Skr. अवदृश्यति (for अवक्खर, with euphonic य्, see H. C. I, 180), and निक्खर = Skr. निदृश्यति (from नि-दृश्). Again क्ख appears to be softened in अवयक्खर, which is probably identical with अवयक्खर. From the manner in which Hemachandra places पेक्ख between निक्खर and अवयक्खर, it would almost seem as if he looked upon it as a contraction of पयक्खर = Skr. प्रदृश्यति (of प्र-दृश्). In classical Sanskrit the futuro of दृश् takes the irregular guṇa र (instead of ऋ, see Panini VI, 1, 58); but in the ordinary speech, no doubt, both forms दृश्यति and दृश्यन्ति were used. It is the latter of the two, from which the Prākṛit forms are derived; thus अवक्खर = अवदक्खर (not = अवदक्खर) = अवदृश्यति. The alternative form of निक्खर would be निक्खर; this seems to be intended by the form णिक्खर in Vr. 8, 69 (with क्ख disaspirated for क्ख). The Pr. पासर is regularly formed from Skr. पश्यति = Pr. पस्सर (see Delius *Rad. Prac.*) or पासर (H. C. 1, 43); and Pr. अवपासर is the Skr. अवपश्यति. In Marāṭhi, the Pr. root पास् becomes पाह्. The Pr. पुलोर is derived from Skr. प्रवलोकयति (with वलि contracted to व, see my Comp. Gramm. § 122); and Pr. पुलर is probably a mere corruption of it. None of all these forms, as far as I am aware, has left any representative in modern Hindi.

133 नद् *dance*, see secondary roots.

134 नव् or नौ intr. *bend, bow* = Skr. नम्, I. cl. नमति, Pr. नमद् (see H. C. 1, 183, नमिन् 1. pl.) or नवद् (H. C. 4, 226), H. नवै or नौरे.

135 नवाव् or निवाव् trans. *bend, fold* = Skr. नम, Causal नमयति, Pr. नवावेद् or VI. cl. नवावद्, H. नवावै or निवावै (with ए for अ, see my Comp. Gramm. § 55).

136 नद्वा *bathe* = Skr. स्ना, II. cl. स्नाति, Pr. IV. cl. एद्वायद् (cf. Dl. 20) or (contr.) एद्वाद् (H. C. 4, 14), H. नद्वाय.

137 नाच् *dance* = Skr. नट्, IV. cl. नटयति, Pr. नचद् (Vr. 8, 47. H. C. 4, 225), H. नाचै.

138 निकाल् or निकार् *pull out*, see secondary roots.

139 निकस् *expel* = Skr. निस्-कस्, Causal' निष्कासयति, Pr. निष्कासेद् or VI. cl. निष्कासद्, H. निकसै; cf. No. 138, the Skr. root कस् being perhaps adopted from Pr. कस् for Skr. छप्.

140 निखोर् or निखोर् *peel*; see secondary roots.

141 निखर् *be cleaned, be peeled* = Skr. नि-चर्, I. cl. निचरति, Pr. निखरद्, H. निखरै.

142 निखार् *clean, peel* = Skr. नि-चर् (or नि-चल), Causal निचारयति, Pr. निखारेद् or VI. cl. निखारद्, H. निखारै.

143 निगल् *swallow*; see secondary roots.

144 निघार् *to make clear* = Skr. नि-स्थल्, Causal निस्थलयति, Pr. निघालेद् or VI. cl. निघालद्, H. निघारै, applied to water, which is made clear by letting it stand still, till the impurities have settled down, and then pouring it off; hence the root has also the meaning "pour off."

145 निवड् *be separated, be decided, be accomplished* = Skr. निर-वड् *divide*, (X. cl. निर्वटयति), Pr. निवडेद् or निवडद् (H. C. 4, 62, where it is said to mean इष्टक् सद्यो वा भवति), H. निवडै. It is the pass. or intrans. form of No. 147. The Skr. root is transitive.

146 निवाच् or निभा *accomplish* = Skr. निस्-वच्, Causal निर्वहयति, Pr. निवाचेद् or VI. cl. निवाहद्, H. निवाचै or निभाच् (with transferred aspiration; see my Comp. Gramm. § 132).

147 निवाड् *separate, divide, accomplish* = Skr. निर-वड् *divide*, Causal निवाडयति, Pr. निवाडेद् or VI. cl. निवाडद्, H. निवाडै. See No. 145.

148 निवेड् *separate, divide, accomplish* = Skr. निर-वड्, I. cl. निर्वहते, Pr. निवेडद्, H. निवेडै (with ए for अ, see my Comp. Gramm. § 148). This is merely another form of No. 147.

149 निवार् *hinder* = Skr. नि-वृ, Causal निवारयति, Pr. निवारेद् (H. C. 4, 22) or VI. cl. निवारद्, H. निवारै.

150 निस् *come out* = Skr. निस्-ह, I. cl. निस्सरति, Pr. निस्सरद् (see R. M. p. 107; or नौसरद् H. C. 1, 93. 4, 79), H. निसर.

151 नोच् *pinch* = Skr. नि-कुञ्च् *contract*, VI. cl. निकुञ्चति, Pr. निउचद् H. नोचै (with ओ for इउ).

- 152 पक् *be digested* = Skr. पक् *digest*, Passive पचते, Pr. पचद्, H. पके.  
 153 पठाव् *send* = Skr. प्र-स्था, Causal प्रस्थापयति, Pr. पठावेद् or VI. cl. पठावद् (H. C. 4, 37), H. पठावै.  
 154 पड़् or पर् *fall* = Skr. पत्, I. cl. पतति, Pr. पडद् (Vr. 8, 51), W. H. पड़े, E. H. परै.  
 155 पढ़् *read* = Skr. पठ्, I. cl. पठति, Pr. पडद् (H. C. 1, 199), H. पड़े.  
 156 परख् or परक् *examine, test* = Skr. परि-ईच्, I. cl. परीचते, Pr. परिकखद्, H. परखै. It also has the secondary meaning "become habituated", owing to repeated trial.  
 157 परक् *become acquainted* = Skr. परि-चि, Pr. VI. cl. \*परिचद्, H. परखै.  
 158 पला or परा *run away* = Skr. पलाय्, I. cl. पलायते, Pr. पलायद् or (contr.) पलाद् (Pingala,\* quoted by R. M. p. 129),\* H. पलाय् or पराय्.  
 159 परिहर् *foraake* = Skr. परि-हृ, I. cl. परिहरति, Pr. परिहरद् (H. C. 4, 259 said to be = त्यजति ), H. परिहरै.  
 160 परोस् *offer food* = Skr. परि-विष्, Causal परिवेषयति, Pr. परिवेषेद् or VI. cl. परिवेसद्, H. परोसै (with जो = इवे, see my Comp. Gramm. § 122).  
 161 पसर् *be spread* = Skr. प्र-श्, I. cl. प्रसरति, Pr. पसरद् (H. C. 4, 77), H. पसरै.  
 162 पसार् *spread* = Skr. प्र-श्, Causal प्रसारयति, Pr. पसारेद् or VI. cl. पसारद्, H. पसारै.  
 163 पसीज् *perspire* = Skr. प्र-सिद्, IV. cl. प्रसिचति, Pr. पसिज्जद् (see H. C. 4, 224), H. पसीजै.  
 164 पख्ज *stitch* = Skr. प्र-सिच्, IV. cl. प्रसीचति, Pr. \*पख्जद् (perhaps contracted for \*पसिज्जद्), H. पख्जै.  
 165 पह्निनाव् or पिह्निनाव् *cause to put on, cause to dress* = Skr. पि-नह्, Causal पिनाहयति, Pr. पिनाहवेद् or VI. cl. पिनाहावद्, H. पिह्निनावै (with transposition of न् and ह्) or पह्निनावै (with transposition of ह् and च, see my Comp. Gramm. § 133). See also Nos. 166, 167 for a similar transposition. From this root is formed the derivative root पिहन् or पहिन् *put on, dress*.  
 166 पह्तिर् *put on, dress* = Skr. परि-धा, Passive परिधीयते (with active sense), Pr. परिधेद् (see Cw. p. 99, sūtra 21 धेद्) or परिधद् (see Wb. p. 59 देद् and दद् of root दा) or परिहद्, H. पह्तिरै (with transposition of र् and ह्, see No. 165). This root, however, might be also a derivative root from पह्तिराव् No. 167. In the Gujarāṭī form पेहर् the ह् of the second syllable has modified the vowel of the first.  
 167 पह्तिराव् *cause to put on, cause to dress* = Skr. परि-धा, Causal परिधाप-

\* पलाय, I suppose, is a misprint for पलाद्.

यति, Pr. परिधावेद् or VI. cl. परिधावद् or परिधावद्, H. परिधावै (with transposition of र् and च्, as in Nos. 165, 166).

- 168 पङ्क्च् or पङ्क्च् or पङ्क्च् *obtain, arrive* = Skr. प्र-ञ्च्, I. cl. प्रभवति, Pr. \*पङ्क्च् or पङ्क्च् (H. C. 4, 390), H. पङ्क्च् or पङ्क्च् or पङ्क्च्. It is formed with the pleonastic suffix क्, like the root षाच्, see introductory remarks; only in this case, क् changes to च् and is afterwards disaspirated. Marāṭhī has पोङ्क्च् or पोङ्क्च्, where the ङ of the second syllable has modified the first.
- 169 पाङ् let fall = Skr. पत्, Causal पातयति, Pr. पाडेद् (H. C. 4, 22) or VI. cl. पाडद् (H. C. III, 153), H. पाङ्.
- 170 पार् accomplish = Skr. पृ, Causal पारयति, Pr. पारेद् or VI. cl. पारद् (H. C. 4, 86), H. पारै.
- 171 पाल् cherish = Skr. पा, Causal पालयति, Pr. पालेद् or VI. cl. पालद्, H. पालै.
- 172 पाव् obtain, find = Skr. प्र-आप्, V. cl. प्राप्नोति, Pr. VI. cl. पावद् (H. C. 4, 239), H. पावै.
- 173 पिघल् melt = Skr. ऋप्- or पि-गल्, I. cl. ऋपिगलति, Pr. पिगलद् H. पिघलै? See my Comp. Gramm. § 131.
- 174 पी drink = Skr. पा, I. cl. पिबति, Pr. पिबद् (H. C. 4, 10), H. पीवै.
- 175 पीच् tread down = Skr. पिष्, Future पेच्छति, (with meaning of present), Pr. पेच्छद् or पिच्छद्, H. पीचै (with disaspiration, as in खेचै, see introductory remarks, p. 40).
- 176 पीङ् be pained = Skr. पीङ्, I. cl. पीडते, Pr. पीडद्, H. पीङ्.
- 177 पीस् grind = Skr. पिष्, VII. cl. पिनष्टि. Pr. X. cl. पिंसेद् or पीसेद् (cf. Ls. p. 347) or VI. cl. पिंसद् or पीसद् (H. C. 4, 185), H. पीचै.
- 178 पुरात् fill, thread = Skr. पृ, Causal पूरयति, Pr. पुरावेद् or VI. cl. पुरावद्, H. पुरावै (or W. H. also पिरावै in the sense of *threading, stringing*).
- 179 पूष् ask = Skr. प्रष्, VI. cl. पृच्छति, Pr. पूच्छद् (H. C. 4, 97), H. पूष्टै.
- 180 पूष् or पेष् wipe = Skr. प्र-उष्, I or VI. cl. प्रोच्छति, Pr. पोच्छद् or पुच्छद् (H. C. 4, 105), H. पोष्टै or पूष्टै.
- 181 पूज् worship = Skr. पूज्, X. cl., but also I. cl. पूजति, Pr. पूजद्, H. पूजै.
- 182 पद् or पैर् swim = Skr. प्र + तृ, I. cl. प्रतरति or VI. cl. प्रतिरति, Pr. पदरद्, E. H. पदरै or W. H. पैरै.
- 183 पद्स् or पेस् enter = Skr. प्र-विष्, VI. cl. प्रविशति, Pr. पविसद् (H. C. 4, 183) or पदसद् H. पदसै or पेसै.
- 184 पेष् squeeze out, shove = Skr. पीङ्, I. cl. पीडते, Pr. पेजद् (H. C. 4, 143), H. पेष्टै. See No. 42, खेष्टै from root ऋष्ट्. Perhaps a denominative of पिष्ट = पेष्ट = पेष्ट = पेष्ट.
- 185 पोस् nourish = Skr. पुष्, I. cl. पोषति, Pr. पोसद्, H. पोष्टै.

- 186 फट् or फाट् *burst* = Skr. स्फट्, Passive स्फट्यते, Pr. फहर, H. फाटे or फटे.
- 187 फल् *bear fruit* = Skr. फल्, I. cl. फलति, Pr. फलर (Spt. 17), H. फलै, Connected with roots स्फट् and पट्; see No. 189.
- 188 फंस or फांस *stick, be ensnared* = Skr. स्फुम्, VI. cl. स्फुमति, Pr. फंसर or फासर (H. C. 4, 182, probably denom. of फंस or फास = स्फुम् cf. Vr. 4; 15. H. C. 2, 92), H. फंसे or फांसे. This root is also used transitively, in the sense of "ensnare", "deceive", see H. C. 4, 129, where फंसर is said to be a substitute of विसंवदति.
- 189 फाट् *cleave, split* = Skr. स्फट्, X. cl. स्फाटयति, Pr. फाडेर or VI. cl. फाडर, (H. C. 1, 198. 232), H. फाड़े. Hemachandra refers it to root पट्, X. cl. पाटयति.
- 190 फाट् *jump* = Skr. खाट् *shake*, Causal खाटयति, Pr. फांदेर or VI. cl. फांदर, H. फांदै. Observe the same transition of meaning as in No. 191. It is also used transitively, in the sense of "ensnare", "imprison", corresponding to the intransitive root फाट्, see secondary roots. H. C. 4, 127 gives फांदर in its original sense of "shaking", "quivering" = Skr. खादते; its synonym चुलचुलर, which H. C. also gives, still exists in H. चुलचुलै or चुलचुलै or चुलमुलै or चुलचुलवै, &c., "he is fidgety."
- 191 फाल् *jump* = Skr. खल् *shake*, Causal खालयति, Pr. फालेर or VI. cl. फालर, H. फालै. Probably connected with root No. 189; H. C. 4, 198. 232 give फालेर as an other form फाडेर.
- 192 फिट् *be paid off, be discharged* = Skr. स्फिट्, X. cl. स्फिटयति, Pr. फिहर (H. C. 4, 177, said to be = खंश् "cease", "decline"), H. फिटै; cf. R. स्फट् and स्फुट्.
- 193 फुट् or फूट् *expand, increase, be broken, be dispersed* = Skr. स्फुट्, Passive स्फुट्यते, Pr. फुहर (Vr. 8, 53. H. C. 4, 177, where it is said to be a substitute of खंश्, in the sense of "being broken"), H. फुटै or फूटै. See No. 194.
- 194 फुल् or फूल् *blossom* = Skr. स्फुट्, VI. cl. स्फुटति, Pr. फुहर or फुडर (Vr. 8, 53) or फुलर (H. C. 4, 387 whence Skr. R. फुल् adopted), H. फुलै or फूलै. See No. 193.
- 195 फेर or फिर *turn, move round* = Skr. परि + र, II. cl. पर्यति, Pr. फेरेर or फेरर (with change of प to फ and of अर्थ to रर, as in-पेरतो for पर्यतः), H. फेरे.
- 196 फैल् *spread, be dispersed* = Skr. स्फिट्, X. cl. स्फोटयति, Pr. फेडेर or VI. cl. फेडर (H. C. 4, 358; in H. C. 4, 177 the simple form फिहर is given as a substitute of खंश्) or फेसर (whence Skr. R. फैल्), H. फैलै. See Nos. 189, 192, 193; the original meaning "split", hence "expand", may change either to "increase" or to "decrease", to growth or to decay.

- 197 जो *unfasten* = Skr. प्रमुञ्च, VI. cl. प्रमुञ्चति, Pr. पमुञ्चर (cf. H. C. 4, 91), H. जोरे (for पोरे = पञ्चरे).
- 198 जोड़ *break* = Skr. स्फुट्, Causal स्फोटयति, Pr. जोडेइ (H. C. 4, 350) or VI. cl. जोडर, H. जोड़े.
- 199 वञ्च *go away, escape* = Skr. व्रज्, I. cl. व्रजति, Pr. वञ्चइ (Vr. 8, 47), H. वचै. More likely from root वञ्च्, or from Pass. हृत्यते of Skr. R. हृत्.
- 200 बज् or बाज् *sound* = Skr. वद्, Causal Passive वाच्यते, Pr. बज्जर (H. C. 4, 406), H. बजै or बाजै.
- 201 बन्ध *be ensnared* = Skr. बध्, Passive बध्यते, Pr. बज्जर (H. C. 2, 26, 4, 247), H. बन्धै.
- 202 बट् tr. and intr. *twist, divide* = Skr. वट्, Passive वट्यते, Pr. बट्जर, H. बटे.
- 203 बढ् or E. H. बाई *grow* = Skr. हृध्, I. cl. वर्धते, Pr. बट्जर (Vr. 8, 44), H. बढै or E. H. बाई.
- 204 बढाव *enlarge, complete* = Skr. हृध्, Causal वर्धयति, Pr. बट्जावेइ or VI. cl. बट्जावइ, II. बढावै. (T. V. 3, 1. 132 has बट्जाविचं = समापितं).
- 205 बताव् *show, relate* = Skr. हत्, Causal वर्त्तयति, Pr. बतावेइ or VI. cl. बतावइ, H. बतावै.
- 206 बध् *kill* = Skr. बध् (or बाध्, I. cl. बाधते), Pr. बधइ, H. बधै.
- 207 बन *be made* = Skr. वन्, Passive वन्यते, Pr. वञ्चइ, H. बने. In Sindhi it means "go, come," cf. the Māgadhī वञ्जइ (H. C. 4, 294) which the Prākṛit Grammarians derive from the Skr. R. व्रज् *go or become*.
- 208 बर *marry* = Skr. वृ, V. cl. वृणोति, but also I. cl. वरति, Pr. वरइ (Vr. 8, 12), H. वरै.
- 209 बरिस् or वरस् *rain* = Skr. हृष्, I. cl. वर्षति, Pr. बरिस्इ (Vr. 8, 11.; perhaps denom. of वर्ष), E. H. बरिस्सै or W. H. वरसै.
- 210 बल् *burn* = Skr. ज्वल्, I. cl. ज्वलति, Pr. बलइ (H. C. 4, 416 बलति), H. बलै.
- 211 बस्  *dwell* = Skr. वस्, I. cl. वसति, Pr. वसइ, H. वसै.
- 212 बस् *flow* = Skr. वस्, I. cl. वसति, Pr. वस्इ (H. C. 1, 38), H. बसै. The root वस्ज् *glide happily, be diverted* is a passive or intrans. of a causal वस्ज्वाव् formed like पिलाव् from पीय् *drink*.
- 213 बाँध *recite, read*; see secondary roots.
- 214 बाँध *wish* = Skr. बाँध्, I. cl. बाँधति, Pr. बाँधइ (T. V. 3, 1. 133), H. बाँध.
- 215 बाँध *bind* = Skr. बध्, IX. cl. बध्नाति, Pr. VI. cl. बधइ (H. C. 1, 187), H. बाँधै.
- 216 बाल् or बार *kindle, light* = Skr. ज्वल्, Causal ज्वलयति, Pr. बालेइ or बालइ, W. H. बालै or E. H. बारै. See No. 210.
- 217 बास् *perfume* = Skr. बास्, X. cl. बासयति, Pr. बासेइ or VI. cl. बासइ, H. बासै.

- 218 विक be sold = Skr. वि-क्री sell, Passive विक्रीयते, Pr. विक्रोर् or विक्रद्, H. विकै (see Vr. 8, 81. H. C. 4, 240, where however the form विक्रोर् is given as act. trans ; in the moderns it is intrans. or pass., and the trans. root is बेच्, cf. No 242.
- 219 विगड् or E. H. विगर् be at variance, be spoiled = Skr. वि-घट्, I. cl. विघटते, Pr. विगडर् (cf. H. C. 4, 112), H. विगड़े (for विगड़े). See No. 46.
- 220 विगाड् make discord, spoil = Skr. वि-घट्, Causal विघाडयति, Pr. विगाडेर् or VI. cl. विगाडर्, H. विगाड़े (for विगाड़े). See No. 54.
- 221 विचार reflect = Skr. वि-चर्, Causal विचारयति, Pr. विचारोर् or VI. cl. विचारद्, H. विचारै.
- 222 बिडर् scatter = Skr. वि-दृ, IX. cl. विदृणति, Pr. I. cl. बिडर्द् (cf. No. 102), H. बिडरै.
- 223 बिडार् drive away = Skr. वि-दृ, Causal विदार्यति, Pr. बिडारोर् or VI. cl. बिडार्द्, H. बिडारै. See No. 102.
- 224 वितर् grant = Skr. वि-तृ, I. cl. वितरति, Pr. वितरद्, H. वितरै.
- 225 बिथार् tr. spread = Skr. वि-स्त, Causal बिथारयति, Pr. बिथारोर् or VI. cl. बिथार्द्, H. बिथारै.
- 226 बिराब् mock ; see secondary roots.
- 227 बिलख् or बिल्क् see, be confused = Skr. वि-लक्ष्, X. cl. बिलक्षयति, Pr. बिलक्खोर् or VI. cl. बिलक्खद्, H. बिलखै or (corrupt) बिलकै.
- 228 बिलग् intr. separate = Skr. वि-लग्, Passive बिलग्यते (with active senso), Pr. बिलग्यद् (cf. Vr. 8, 52), H. बिलगै.
- 229 बिलग् ascend = Skr. वि-लम्ब, I. cl. बिलङ्गति, Pr. बिलम्बद्, H. बिलंगै (for बिलंबै).
- 230 बिलस् be pleased = Skr. वि-लप्, I. cl. बिलसति, Pr. बिलसद्, H. बिलसै.
- 231 बिलाव् tr. and intr. disperse, vanish = Skr. वि-लौ, Causal बिलापयति, Pr. बिलावोर् or VI. cl. बिलावद्, H. बिलावै.
- 232 बिहर् enjoy one's-self = Skr. वि-हृ, I. cl. बिहरति, Pr. बिहरद् (H. C. 4, 259 where it is said to be a substitute of Skr. क्रीडति), H. बिहरै.
- 233 बिहाय् or बिहा leave, spend = Skr. वि-हा, III. cl. बिजहाति, Pr. I. cl. बिहायद् or बिहायद् or (contr.) बिहार, H. बिहायै or बिहाय् ; cf. Vr. 8, 26.
- 234 बिस् forget = Skr. वि-स्मृ, I. cl. बिस्मरति, Pr. बिस्मरद् (cf. H. C. 4, 74), H. बिस्मरै.
- 235 बीक् tear, break up = Skr. भिद्, Passive भिद्यते (used actively), Pr. भिज्जद्, H. बीकै (for बीजे, with aspiration transferred ; see my Comp. Gramm. § 132), or perhaps Skr. बध्, IV. cl. बिध्यति, Pr. बिडभद्, H. बीकै.
- 236 बीत् pass ; see secondary roots.
- 237 बीन् or बिन् choose = Skr. बी, IX. cl. बीणति or बिणति, Pr. VI. cl. बीणद् or बिणद्, H. बीनै or बिनै.

- 238 बुझ् *be extinguished* = Skr. वि-ञ्च-ञ्चै, I. cl. चञ्चयति, Pr. बोझोर or बोझर (or बु०), H. बुझै. See Weber Spt p. 32.\*
- 239 बुड् or बुड् *dive, sink* = Skr. ब्रुड्, VI. cl. ब्रुडति Pr. बुडर (H. C. 4, 101), H. बुडे or बुडे or W. H. transposed डुबै or डुबै.
- 240 बुत् *be extinguished* = Skr. वि-ञ्च-हन् *come to an end*, I. cl. चञ्चन्ते, Pr. व वनर or वनर or वनर, H. बुत्तै. Compare H. वत्तै = वत्तिका *light*, lit. *wick*.
- 241 बुहार *gather, sweep* = Skr. वि-ञ्च-ह, Causal चञ्चयति, Pr. बोहारेर or VI. cl. बोहार, H. बुहारै.
- 242 बुझ् *understand* = Skr. बुध्, IV. cl. बुध्यते, Pr. बुझर (Vr. 8, 48), H. बुझै.
- 243 बेच् *sell* = Skr. बच् *cheat*, VI. cl. विचति, Pass. बचते (used actively), Pr. बेचर (H. C. 4, 119, T. V. 3, 3. 4, transl. प्रयच्छति?), E. H. बेच्; or perhaps Skr. दि-ञ्चति + इ *spend*, II. cl. चञ्चति, Pr. बेचेर or बेचेर?
- 244 बेह् *surround*; see secondary roots.
- 245 बैस् or बरस् *sit* = Skr. उप-विश, VI. cl. उपविशति, Pr. उविसर H. बरसे or बैसे (with loss of initial उ, see my Comp. Gramm. § 173).
- 246 बो *sow* = Skr. वप्, I. cl. वपति, Pr. बावर or बावर (formed like सोवर of लप्, H. C. 1, 64), H. बाए.
- 247 बोड् *immerse* = Skr. ब्रुड्, Causal ब्रुडयति, Pr. बोडेर or VI. cl. बोडर, H. बोडे.
- 248 बोलाव् or बुलाव् or बलाव् *call* = Skr. वद्, Causal वादयति, Pr. बोलावेर or VI. cl. बोलावर, H. बोलावै, &c. See No. 249.
- 249 बोध् *wheel* = Skr. बुध्, Causal बोधयति, Pr. बोधेर or VI. cl. बोधर, H. बोधै.
- 250 बोल् *speak* = Skr. वद्, I. cl. वदति, Pr. बोजर (H. C. 4, 2.) or बोजर (Cw. 99), H. बोले. (cf. No. 245 वप् = बोव्, so वद् = बोल्).†

\* The simple root चै would form Pr. भाचर and contracted भार, after the analogy of ठाचर, ठार from स्था, भाचर or भार from धे (Vr. 8, 26); this is born out by Pāli भायति, and by Pr. विञ्चार (H. C. 2, 28 = Skr. वि-ञ्चयति); but in compounds the Pr. form might be ०भोर or ०भर, just like ०डेर or ०डर in उडेर, उडर form उन्+स्था (H. C. 4, 17); thus we should have regularly बोञ्जेर or (as o is short before a conjunct) बुञ्जेर, बुञ्जर.

† This root is usually connected with Skr. वद् by Prākṛit Grammarians, see Cw. p. 99, where बोचर or बोचर, of root वच्, is mentioned as an analogous formation. Now the latter is derived from the passive \*बुचते (उचते), in an active sense, as appears from H. C. 4, 161. Similarly, I am inclined to derive बोजर from the passive \*बुर्थते (for ब्रुथते of root ब्रु), used actively. The conjunct र्थ becomes र्, as in पञ्चां = पञ्चां, सोचनं = सोचनं (Vr. 3, 21).

- 251 मच् *eat, devour* = Skr. मच्, I. cl. मचति, Pr. मचद्, H. मचे.  
 252 मज् *worship* = Skr. मज्, I. cl. मजति, Pr. मजद्, H. मजे.  
 253 मज् or माज् *flee* = Skr. मज् *break*, Passive मच्यते (used actively), Pr. मज्जद्, H. मजे or माजे.  
 254 मंज् *break* = Skr. मंज्, VII. cl. मनक्ति, Pr. VI. cl. मंजद् (H. C. 4, 106), H. मंजे.  
 255 मच् *speak* = Skr. मच्, I. cl. मचति, Pr. मचद् (H. C. 4, 239), H. मने.  
 256 मर् *fill* = Skr. मर्, III. cl. विभर्ति and I. cl. भरति, Pr. मरद् (cf. Spt. 288 भरति), H. मर.  
 257 मव् or भौ *revolve* = Skr. मव्, I. cl. मवति, Pr. मवद् (H. C. 4, 161) or भवद् (cf. H. C. 4, 401), H. भवे or भौरे. See No. 134 नव् or नौ.  
 258 मंस् *float* = Skr. मंस्, I. cl. मंश्ते, Pr. मंसद्, H. मंसे.  
 259 माल् *see* = Skr. माल्, X. cl. मालयते, Pr. मालेद् or VI. cl. मालद्, H. माले.  
 260 भास् *appear* = Skr. भास्, I. cl. भासते, Pr. भासद् (H. C. 4, 203), H. भासे. Pr. has also the form भिसद् which is preserved in the Hindi root भिसल् *dazzle*.  
 261 भोज् *be afflicted* = Skr. भिद् *break*, Passive भिद्यते, Pr. भिज्जद्, H. भोजे. See No. 234. Or from अभि-चर्द् *afflict*, Pass. अभ्यर्च्यते, Pr. अभिज्जद्, H. भोजे (with loss of च, see my Comp. Gramm. § 172).  
 262 भोज् *be wet*; see secondary roots.  
 263 भुज् *eat* = Skr. भुज्, VII. cl. भुनक्ति, Pr. VI. cl. भुजद् (H. C. 4, 110), H. भुजे.  
 264 भून् *fry*; see secondary roots.  
 265 भेङ् *close*, for बेङ् with transposed aspiration, see No. 244.  
 266 भेट् *meet, visit* = Skr. अभि-चर्द्, I. cl. अभ्यटति, Pr. चम्बद्, H. भेटे (with loss of initial च; and with ए for इ; see my Comp. Gramm. §§ 148, 172).  
 267 मच् *be raised up, be made, be stirred up, be excited* = Skr. मच् or मच्, Passive मच्यते, Pr. मचद् (H. C. 4, 230 where it is referred to the Skr. root मच्), H. मचे. From it are derived many Hindi nouns, all meaning lit. "an erection", माचा or मचा or मचान or मचाला *a large bedstead or stage*, मचिय *a small bed, stool*, मच् *drowsiness*; also many secondary roots, as मचमज् *creak in the joints* (as a bedstead, &c.), मचक् *creak or pain in the joints*, मचक्ताव् *wink*, मचल् or मचलाव् *be seditious, be perverse, feel nausea*.  
 268 मंज् *clean* = Skr. मंज्, II. cl. मर्चि and I. cl. मज्जति, Pr. मंजद् (whence Skr. R. मंज् X. cl.), H. मंजे.  
 269 मक् *cover* = Skr. मक्; see secondary roots.

- 270 मन् *be propitiated* = Skr. मन्, Causal Passive मान्यते, Pr. मन्नर, H. मनै. See No. 277.
- 271 मर् *die* = Skr. मृ, VI. cl. म्रियते, but Vedic also I. cl. मरति, Pr. मरद् (Vr. 8, 12), H. मरै.
- 272 मल् *rub* = Skr. मृद्, IX. cl. मृद्नाति Pr. VI. cl. मल्लर (Vr. 8, 50), H. मल्लै.
- 273 मच् *churn* = Skr. मघ्, I. cl. मघति, Pr. मघद् (cf. Dl. 53), H. मघै.
- 274 माग् *ask for* = Skr. मार्ग, X. cl. मार्गयति and I. cl. मार्गति, Pr. मग्गद् (Spt. 71), H. मगौ. Cp. Skr. R. मग्, IV. cl. मग्यति, which would give the Pr. मग्गद् equally well; but the denom. R. मार्ग is the more probable source, as Pr. and Gaud. have a preference for denominative verbs.
- 275 मांज् *scour* = Skr. मार्ज, X. cl. मार्जयति (or R. मृज्, X. cl. मार्जयति, see remarks on No. 274), Pr. मंजद् or VI. cl. मंजद्, H. मांजै.
- 276 माड् or माड् *rub* = Skr. मृद्, IX. cl. मृद्नाति or I. cl. मर्दति, Pr. मडुद् (H. C. 4, 126), H. माडै or माडै.
- 277 मान् *honor, heed* = Skr. मन्, Causal मानयति, Pr. मानेद् or VI. cl. मानद्, H. मानै, See No. 270.
- 278 माप् or नाप् *measure* = R. मा, Causal Passive माप्यते (used actively), Pr. माप्यद्, II. मापै. The form नाप् is either a mere corruption of माप्, or it may be similarly derived from the Causal Passive ज्ञाप्यते (of root ज्ञा), Pr. नप्यद्, II. नापै.
- 279 मार *bent, kill* = Skr. मृ, Causal मारयति, Pr. मारेद् (H. C. 4, 337) or VI. cl. मारद् (H. C. 3, 153), H. मारै.
- 280 मिल् *meet* = Skr. मिल्, VI. cl. मिलति, Pr. मिलद् (H. C. 4, 332), H. मिलै.
- 281 मिस् *be pulverised* = Skr. मृश्, VI. cl. मृशति, Pr. मिसद्, H. मिशै.
- 282 मौद् or मौच् *wink* = Skr. मिष्, future मेक्ष्यति (used in sense of present), Pr. मेच्छद् or मिच्छद्, H. मौक्षै or (corrupt) मौक्षै. See introductory remarks pp. 37—40, and No. 175.
- 283 मौज् or मौज् *rub* = Skr. मृज्, II. cl. मार्षि or I. cl. मृज्जति, Pr. मंजद्, H. मौंजै or मौंजै.
- 284 मूड् *shave* = Skr. मुण्ड्, I. cl. मुण्डति, Pr. मुण्डद् (H. C. 4, 115), H. मूण्डै.
- 285 मूस् *steal* = Skr. मूष्, I. cl. मूषति, Pr. मूषद् (T. V. 2, 4. 69), H. मूषै.
- 286 मोच् *allure* = Skr. मुच्, Causal मोचयति, Pr. मोचेद् or VI. cl. मोचद्, H. मोचै.
- 287 रक् *keep, place* = Skr. रच्, I. cl. रक्षति, Pr. रक्खद् (H. C. 4, 439), H. रक्षै.
- 288 रच् intr. *be made* or tr. *make* = Skr. रच् *make*, Passive रच्यते (used actively), Pr. रचद् (cf. H. C. 4, 422, 23 रचसि. Spt. 363 रचिष = रचित), H. रचै.

- 289 रम् *roam, enjoy* = Skr. रम्, I. cl. रमते, Pr. रमद् (H. C. 4, 168), H. रमै.
- 290 रश् *stop, remain* = Skr. रश्, Passive रच्यते Pr. रचद्, H. रचे (for रचे)\*
- 291 राज् *be adorned* = Skr. रज् or रज्, IV. cl. रज्यति, Pr. रजद्, H. राजै
- 292 रौघ् or रौघ् *cook* = Skr. रघ्, Causal रच्यति, Pr. रचेद् or VI. cl. रधद्, H. रौघै or (corr.) रौघै.
- 293 रिस् *be vexed* = Skr. रिष्, IV. cl. (or Pass.) रिच्यते, Pr. रिस्द्, H. रिस्.
- 294 रच् *be agreeable* = Skr. रच्, Passive रच्यते. Pr. रचद् (H. C. 4, 341), H. रचै.
- 295 रप् intr. *be fixed, stop* = Skr. रप्, Causal Passive रोच्यते, Pr. रोचद् or रचद्, H. रपै.
- 296 रस् or रुस् *be angry* = Skr. रप्, IV. cl. रच्यति, Pr. रचद् or रुचद् (Vr. 8, 46), H. रसै or रुसै; cf. No. 302.
- 297 रंद् or रंद् or रौद् or रौद् *trample on*, probably a corrupt spelling of the following, No. 298.
- 298 रंघ् or रंघ् or रौघ् or रौघ् *enclose, restrain* = Skr. रघ्, VII. cl. रघति, Pr. रंघद् (Vr. 8, 49), H. रंघै or रंघै or रौघै or रौघै.
- 299 रंग् *creep* = Skr. रिंग्, I. cl. रिंगति, Pr. रिंगद् or रिग्द् (H. C. 4, 259), H. रंगै.
- 300 रो weep = Skr. रद्. II. cl. रोदति, Vedic also VI. cl. रदति. Pr. रवद् (H. C. 4, 226, 238) or रचद् (Spt. 311) or I. cl. रोवद् (H. C. 4, 226, 238) or रोचद् (K. I. 4, 69), II. रोचै or रोचै.
- 301 रोल् *roll, plan* = Skr. लुल्, I. cl. लोलति, Pr. लोलद्, H. रोलै.† See Nos. 313, 314.
- 302 रोस् *be angry* = Skr. रप्, Vedic I. cl. रोषति, Pr. रोषद्, H. रोषै; cf. No. 296.
- 303 लस् *see* = Skr. लच्, I. cl. लचते, Pr. लचद्, II. लचै.
- 304 लग् *be applied* = Skr. लग्, Passive लग्यते, Pr. लगद् (Vr. 8, 52), H. लगै.
- 305 लंघ् or लौघ् *jump over* = Skr. लंघ्, I. cl. लंघति, Pr. लंघद्, H. लंघै or लौघै.
- 306 लड् or R. H. लर् *dispute, fight* = Skr. लड्, X. cl. लडयति, Pr. लडेद्

\* The derivation is somewhat obscure; but it can hardly be referred (as Bs. III, 40) to the Skr. root रच् which has a very different meaning "desert". The derivation from रच is supported by the Marāṭhī form राच् = र.च्. On the change of र्च् to र्च्, see my Comp. Gramm. § 116.

† There is a large number of Skr. roots, all closely connected in meaning; viz. रड्, रड्, रोड्, रौड्; लुड्, लुड्, लुल, लोल, &c.

- or VI. cl. लड्, W. H. लड़े or E. H. लरै.
- 307 लस् or लास् *shine, be fit* = Skr. लस्, I. cl. लसति or X. cl. लासयति, Pr. लसद् or लासद्, H. लसै or लासै.
- 308 लड् *find, avail, get on well* = Skr. लभ्, I. cl. लभते, Pr. लडद् (H. C. 4, 335), H. लडै.
- 309 लाज् *feel ashamed* = Skr. लज्, I. cl. लज्जति, Pr. लाजद् (H. C. 4, 103), H. लाजै.
- 310 लिख् *write* = Skr. लिख्, VI. cl. लिखति, Pr. लिखद्, H. लिखै The ordinary Pr. root लिङ् (H. C. 1, 187 लिङद्) does not exist in Hindî.
- 311 लिप् *be smeared* = Skr. लिप्, Passive लिप्यते, Pr. लिप्यद्, H. लिपै.
- 312 लौप् or लेप् *smear* = Skr. लिप्, VI. cl. लिप्यति, Pr. लिंपद् (H. C. 4, 149), H. लौपै or लेपै. As to the change of ड् to र, see my Comp. Gramm. § 148.
- 313 लुङ् *roll* = Skr. लुङ्, VI. cl. लुङति, Pr. लुङद्, H. लुङै. See Nos. 301, 314, 317.
- 314 लुङ् *roll* = Skr. लुठ्, VI. cl. लुठति, Pr. लुठद्, H. लुठै.
- 315 लूढ or लूढ् *rob* = Skr. लुण् or लुण् I. cl. लुण्ठति or लुण्ठयति, Pr. लुण्ठद् or लुण्ठद्, H. लूढै or लूढै.
- 316 ले *take* = Skr. लभ्, I. cl. लभते, Pr. लडद् or लेद् (H. C. 4, 238), H. लेय् or ले. The syllable लङ् is contracted into ले; similarly कह् *speak* is sometimes pronounced कै, and सह *bear*, से.
- 317 लाड् *roll about* = Skr. लुठ्, VI. cl. लुठति, Pr. लाडद् (H. C. 4, 146 in the sense "rolling about in sleep"), H. लाडै.
- 318 लोभ् *be enamoured* = Skr. लभ्, IV. cl. लुभति, Pr. लुभद् (H. C. 4, 153), H. लोभै. As to the change of उ to ओ, see my Comp. Gramm. § 148.
- 319 वार् *surround* = Skr. वृ, Causal वारयति, Pr. वारैद् or VI. cl. वारद्, H. वारै.
- 320 सक् *can* = Skr. शक्, Passive शक्यते (used actively), Pr. सकद् (Vr. 8 52), H. सकै.
- 321 संहार or संहार (or समार) *destroy* = Skr. सम्-हृ, Causal संहारयति, Pr. संहारैद् or संहारैद् (cf. H. C. 1, 264) or VI. cl. संहारद् or संहारद्, H. संहारै or संहारै (or समारै). Or a denominative of संहार.
- 322 सञ् *collect* = Skr. सम्-ञि, Passive सञ्चीयते (used actively), Pr. सञ्चैद् (cf. H. C. 4, 241 उञ्चैद्) or VI. cl. सञ्चद् (as उञ्चैद् for उञ्चैद्), H. सञ्चै.
- 323 सट् or सट् *be combined* = Skr. सम्-श्रा, Passivo सञ्शीयते (used actively), Pr. सटैद् or VI. cl. सटद् (like उटैद् and उटद्), H. सटै or (corr.) सटै.

- 324 रुद् or रुत् *rot* = Skr. रुद् (or रुद्), I. cl. रीदति, but Vedic also रुदति, Pr. रुदद् (H. C. 4, 219; in Vr. 8, 51 it is ascribed to रुद्), W. H. रुदे or E. H. रुदै.
- 325 सताच् *persecute, torment* = Skr. सन्-तप्, Causal सन्तापयति, Pr. संतावेद् or VI. cl. संतावद्, H. सतावै.
- 326 रुद् *leak* = Skr. रुद्, I. cl. रुन्दते, Pr. रुन्दद्, H. रुदै. As to elision of the nasal, see my Comp. Gramm. §§ 143, 146. See No. 353.
- 327 संभाल् or संहाल् or समाल् *sustain* = Skr. सम्-हृ, Causal सम्भारयति, Pr. संभारेद् or VI. cl. संभारद् H. संभालै, &c. Or demon. root of सम्भार.
- 328 समाच् *be contained* = Skr. सम्-आप्, V. cl. समाप्नोति, Pr. X. cl. समावेद् H. C. 4, 142) or VI. cl. समावद्, H. समावै See No. 172.
- 329 समुक्त् or समुक्त् *understand* = Skr. सम्-बुष्, IV. cl. समुबुधते, Pr. संवुबुधद्, E. H. समुभै or W. H. समभै. See No. 242.
- 330 रुत् *issue, be ended* = Skr. रु, I. cl. सरति, Pr. सरद् (Vr. 8, 12), H. सरै.
- 331 सराच् *commend* = Skr. स्थाप, I. cl. स्थापते, Pr. सलाहद्, (H. C. 2, 101 has सुलहद् ?). II. सराहै.
- 332 रुल् *pierce* = Skr. रुल् or रुल्, I. cl. रुलति or रुलति, Pr. रुलद्, H. रुलै.
- 333 संवार् or सवार् or समार् *prepare* = Skr. सम्-हृ, Causal संवारयति, Pr. संवारेद् or VI. cl. संवारद्, H. संवारै, &c.
- 334 रुद् *endure* = Skr. रुद्, I. cl. रुदते, Pr. रुदद् (H. C. 1, 6), H. रुदै.
- 335 रुद् *arrange* = Skr. रुम् + हृ, I. cl. रुदरति, Pr. रुदरद् (H. C. 4, 259 = Skr. रुदरोति, in H. C. 4, 82 also रुदरद्), E. H. रुदरै.
- 336 रुप् *settle* = Skr. रुप्, Causal रुपयति, Pr. रुपेद् (cf. Spt. 188 रुपेद्) or VI. cl. रुपद् (cf. Spt. 260 रुपद्), H. रुपै. The form रुप् does not occur in Hindī.
- 337 रुद् *accomplish* = Skr. रु, Causal रुरयति, Pr. रुरेद् or VI. cl. रुरद् H. रुरै.\*
- 338 रुल् *pierce* = Skr. रु, Causal रुरयति, Pr. रुरेद् or VI. cl. रुरद्; H. रुलै. Or from Causal of रुल्, see No. 332.
- 339 रुप् *threaten, distress* = Skr. रुम्, Causal रुपयति, Pr. रुपेद् or VI. cl. रुपद् (H. C. 4, 197 where however it is = रुपते), H. रुपै.
- 340 री *sew* = Skr. रुच्, IV. cl. रीचति, Pr. VI. cl. रुिद् or रुिद्, H. रीदे. H. C. 4, 230 gives रुिद् which would be रीदे in H., but it does not exist; there is, however, another reading रुिद्, H. रीचै which does exist, see No. 342.
- 341 रील् *learn* = Skr. रुिच्, I. cl. रुिचते, Pr. रुिचद् (cf. Spt. 353), H. रीचै.
- 342 रीच् or रीच् or रीच् *irrigate* = Skr. रुिच्, VI. cl. रुिचति, Pr. रुिचद्,

\* The root means also “*polish*” (by rubbing, striking); perhaps this is the रुरद् mentioned by H. C. 4, 84 as equivalent to the Skr. रुचरति,

- (H. C. 4, 239) or सिखद् (H. C. 4, 230), H. सौँचै or सौचै or (corr.) सौँचै (cf. Vr. 2, 41 हन० = सप्त०, Ls. 199.)
- 343 सौज *exude, sweat* = Skr. सिद्, IV. cl. सिद्यति, Pr. सिज्जद् (H. C. 4, 224), H. सौजे. See also No. 344.
- 344 सौज *seethe, boil, exude, sweat* = Skr. औ (or या), Passive औयते, Pr. सिज्जद्, H. सौजे.
- 345 सौज *be received (as money) be liquidated (as debt)* = Skr. श्रि, Passive औयते, Pr. सिज्जद्, H. सौजे.
- 346 सुधार् *adorn* = Skr. सु-ध, Causal सुधारयति, Pr. सुधारेद् or VI. cl. सुधारद्, H. सुधारे.
- 347 सुन् *hear* = Skr. श्रु, V. cl. शृणोति, Pr. VI. cl. सुणद् (Vr. 8, 56), H. सुनै.
- 348 सुमर् *remember* = Skr. स्मृ, I. cl. स्मरति, Pr. सुमरद् (Vr. 8, 18), H. सुमरै.
- 349 सुहाव् *be agreeable* = Skr. सुख्, X. cl. सुखयति, Pr. सुहावेद् (Spt. 169) or VI. cl. सुहावद्, H. सुहावै.
- 350 सूँध् *smell at* = Skr. सम-ञ्चा-न्ना, I. cl. समाजिघ्रति or II. cl. समान्नाति, Pr. समग्वेद् or VI. cl. समग्वद्, H. सूँधै.\*
- 351 सूँज् *swell* = Skr. श्वि, Passive श्रुयते, Pr. सुज्जद्, H. सूँजे.
- 352 सुम् *appear* = Skr. श्रुष्, IV. cl. श्रुष्यति, Pr. सुज्जद्, (cf. H. C. 4, 217), H. सुमै.
- 353 सैँद् *irrigate* = Skr. सिद्, Causal सिन्दयति, Pr. सिंदेद् or VI. cl. सिंदद्, H. सैँदै cf. No. 326.
- 354 सेव् or सेह् *serve, worship* = Skr. सेव्, I. cl. सेवते, Pr. सेवद् (H. C. 4, 396), H. सेवे or सेहै (with euphonic ह्, see my Comp. Gramm. § 69).
- 355 सोच् *regret, meditate* = Skr. श्रप्, Passive श्रुयते (used actively) Pr. सुचद्, H. सोचै.
- 356 सोह् *shine, be fit* = Skr. श्रम्, I. cl. श्रोमते, Pr. सोहद् (H. C. 1, 187), II. सोहै.
- 357 सौप् *deliver* = Skr. सम्-पद्, Causal सम्पद्यति, Pr. सम्पयेद् or VI. cl. सम्पयद्, H. सौपै. See No. 349, footnote.
- 358 हन् *kill* = Skr. हन्, II. cl. हन्ति, but Vedic also I. cl. हनति, Pr. हणद् (H. C. 4, 418), II. हनै.
- 359 हर् *take away* = Skr. ह्, I. cl. हरति, Pr. हरद् (H. C. 4, 234), H. हरै.

\* •प्त्रा would form •ग्वेद् or ग्वद् in Pr., just as •ङ्देद् or •ङ्दद् of •ख्या; and सम् would contract to सूँ in Hindi, just as in सै पे for Pr. सम्पयद्, see No. 357; the intermediate form being सवग्वद् (cf. H. C. 4, 397). The root, however, might be derived from Skr. सिंघ्, I. cl. सिंघति, Pr. सिंघद्; only the Hindi ought to be सौघै; and the change of ई to ञ would be very anomalous. (Dr. R. Mitra in his vocabulary quotes घे गञ्जोपादाने ?).

- 360 हरिस् or हरस् *be glad* = Skr. हृष्, I. cl. हर्षति, Pr. हरिस् (Vr. 8, 11; perhaps denom. of हरिस् = हर्ष Vr. 3, 62), E. H. हरिस् or W. H. हरिस्. See No. 209.
- 361 हलस् *toss about* = Skr. कल्, (Causal Passive कल्यते), Pr. हल्यद्, H. हल्यै.
- 362 हवा *scream* = Skr. क्ते, I. cl. कयति, Pr. VI. cl. हवायद् or (contr.) हवाद्, H. हवाय्.
- 363 हंस् or हांस् *laugh* = Skr. हस्, I. cl. हसति, Pr. हसद् (T. V. 2, 4. 69) or हस्यद् (Passive), H. हंसै or हंसै.
- 364 हाँप् or हाँप् *blow* = Skr. भा, Causal भापयति, Pr. भंपेद् or VI. cl. भंपद् or हंपद्, H. हाँपै or (corr.) हाँपै.
- 365 हाल् intr. *shake* = Skr. कल्, Passive कल्यते (used actively), Pr. हलद्, H. हालै. See No. 68.
- 366 हिल् intr. *shake* = Skr. कृ, I. cl. करति, Pr. VI. cl. हिरद् or हिलद्, H. हिलै.
- 367 ऊन् *sacrifice* = Skr. धू, V. cl. धुनोति, Pr. VI. cl. धुणद् or ऊणद् (H. C. 4, 241 where it is referred to Skr. root ऊ), H. ऊने.
- 368 हल्ल *drive, goad* = Skr. हृङ् go, Causal हृङयति, Pr. हृङेद् or VI. cl. हृङद्, H. हल्लै.
- 369 हो *be* = Skr. भू, I. cl. भवति, Pr. भवद् or हवद् or ऊवद् or होद् (H. C. 4, 60), H. होय

## PART II.—*Secondary Roots.*

Comp. = compound root ; den. = denominative ; der. = derivative ; N. = noun ; P. P. P. = past participle passive.

The Sanskrit equivalents are not given, unless when they actually exist ; what theoretically they might have been, has been explained in the introductory remarks ; see also my Comparative Grammar, §§ 351—354.

Some of the explanations attempted in this list, are, of course, only tentative ; a few such have been indicated by a mark of interrogation.

- 1 comp. अटक् *be hindered, stopped* = Skr. अट् + छ, Pr. अट्कोद् or अट्कोद्, H. अट्को.
- 2 comp. उचक् *be raised, rise* = Skr. उच + छ, Pr. उचकोद् or उचकोद्, H. उचको.
- 3 comp. उवक् *vomit* = Skr. उद्-वस् + छ, Pr. उव्कोद् or उव्कोद्, H. उवको.
- 4 comp. उक् or औक् *vomit* = Skr. वस + छ, Pr. वसकोद् or वसकोद्, Ap. Pr. वसकोद्, H. औको or औको (with औ for अव or वस, see my Comp. Gramm. § 122).

- 5 der. उखड् *be pulled out, slip out*, a passive or intransitive, derived from उखाड्, see No. 6.
- 6 den. उखाड् or उखेड् *pull out, uproot* = Skr. P. P. P. उल्लह, Pr. उल्लहृद् (cf. H. C. 4, 187), H. उखाड़े (for उकाड़े, with transferred aspiration, see my *Comp. Gramm.* § 132) or उखेड़े (for उकेड़े with change of *a* to *e*, see my *Comp. Gramm.* § 148). See No. 13.
- 7 den. ओढ् *put on, dress* = Skr. उपवेष्ट, I. cl. उपवेष्टे, Pr. ओवेष्टृद्. (cf. H. C. 4, 221), H. ओढ़ै (contracting ओवे to ओ). Probably from a P. P. P. of the root विष्.
- 8 comp. कड़क् *crackle, thunder* = Skr. कर्द + छ, Pr. कडुकर or कडुकर, H. कड़कै.
- 9 den. कमाव् *earn* = Skr. N. कर्म; Pr. कमावेद् or कमावद्, (H. C. 4, 111 has कमावद् and gives it as a substitute of the root उपमुञ्ज; the *ā* is shortened to *a*, by H. C. 3, 150), H. कमावै.
- 10 comp. कसक् *be painful, be pained* = Skr. कष + छ, Pr. कसकर or कसकर, H. कसकै.
- 11 der. काट् *be cut*, a passive or intransitive, derived from root काट्, see primary roots, No. 27.
- 12 der. कड् *be pulled out, escape*, a passive or intransitive, derived from root काट्. See No. 13.
- 13 den. काढ् *pull out* = Skr. P. P. P. छह; Pr. कडुद् (H. C. 4, 187), H. काढ़ै.
- 14 comp. खरक् or खड़क् *make a tremulous noise, rustle, rattle* = Skr. खल्ल + छ; Pr. खल्लकर or खडकर, H. खरकै or खड़कै. There is also a reduplicated root खरखर् or खड़खड़ of the same meaning. They also occur in Maráthí and Panjábí. The primary meaning of the root is; *slip or glide along with a sound*; this is preserved in the Maráthí खरक् or खड़क् which is used of the running of a stream, or the crashing of a boat, dragged over gravel, &c. The simple root खड् occurs in Maráthí with its original meaning *be shed, fall off*; also in Panjábí, where however it has become transitive, *carry off*. The change of ल or र to ड or ङ is anomalous; but it already took place in Prákrit; thus in Spt. 44, अक्खडड् for Skr. आखल्लनि, Spt. 195 खडिष for Skr. खल्लिन. Perhaps there may be a connection with the root खण्ड्; compare also the roots खर् and खल्. See also roots चरक् and फरक्.
- 15 der. गड् *be hollowed, be sunk*, a passive or intransitive, derived from root गाड्; see No. 16.
- 16 den. गाड् *hollow, bury* = Skr. N. गर्त, Pr. गडु (Vr. 3, 25), Pr. गडुद् or गडुद्, H. गाढ़ै. Or possibly a mere corruption of root गाड्, No. 17, by disaspiration.

- 17 den. गड् *dig in, fix in, bury* = Skr. P. P. P. गड् (of root गड्), Pr. गडद्, H. गड्.
- 18 den. गोड् *mark, brand* = Skr. N. गोदं; Pr. गोदेद् or गोदद्, H. गोदे (?) ; brands being made on the forehead or bosom.
- 19 den. घबराव् *be alarmed, agitated*, perhaps corrupted form गड्बड्वाव् with the same meaning, a reduplicative or alliterative form, made from गड् = Skr. N. गदं *noise, cries of alarm* (P).
- 20 den. विनाव् or विनियाव् *be disgusted* = Skr. N. वृणा or deminutive वृणिका (of root वृण्), Pr. विणा (H. C. 1, 128) or विणिया; Pr. विणावेद् or विणियावेद् or विणावद् or विणियावद्, H. विनावै or विनियावै.
- 21 der. चिर् *be collected, surrounded, gather*, a passive or intransitive of root चेर. See primary roots, No. 64.
- 22 comp. चपक् *be compressed, collapse* = Skr. चप or चर्प + छ, Pr. चपक्केद् or चपक्कद्, H. चपकै.
- 23 comp. चमक् *glitter* = Skr. चमत् + छ, pass. चमत्क्रियते (with active meaning), Pr. चमक्केद् or चमक्कद्, H. चमकै.
- 24 den. चाव् *wish*, corrupted for छाव्, see No. 40.
- 25 der. चिर् *be torn, split*, a passive or intransitive, derived from root चीर्; see No. 31.
- 26 den. चिकनाव् *smooth, polish* = Skr. N. चिक्षण (or चिक्षिण; perhaps itself a compound word of चित् *bright* = चिब, and छ = Pr. चिब; lit. *made clear*); Pr. चिक्षणावेद् or चिक्षणावद्, H. चिकनावै.
- 27 den. चिडाव् or चिडाव् *abuse, vex* = Skr. P. P. P. चिप् (from root चिप् *abuse*); Pr. चिडावद्, H. चिडावै (with transfer of aspiration) or चिडावै (with loss of aspiration). As to the changes of aspiration, see No. 47 चेङ् or चीङ्, where it is preserved; also primary root, No. 65 चङ् (footnote, p. 45). As to the change of ण to न to ङ (or ञ), compare root जुडाव् from P. P. P. युक्त; and primary roots Nos. 92, 93 जुङ् and जोङ्.
- 28 den. चिताव् *make known to, warn, admonish* = Skr. P. P. P. चित्; Pr. चितावेद् or चितावद् (cf. S. B. 11, 1), H. चितावै. In Setubandha 11, 1 occurs the past participle चितविषं (with *a* for *á*, by H. C. 3, 150), which is correctly explained by the commentator as meaning चेतितं *made known to*, or निवृत्तं *restrained, warned* (or निवृत्तं), परितोषितं *admonished, comforted*; (see S. Gdt. pp. 84, 156).
- 29 den. चीत् *paint* = Skr. N. चिब; Skr. चिबयति, Pr. चितेद् or चितद्, H. चीतै.
- 30 den. चीन् or चीङ् *recognize* = Skr. N. चिक्, Pr. चिपद् (H. C. 2, 50); Skr. चिक्कयति, Pr. चिपक्केद् or चिपक्कद्, H. चीकै or चीनै.
- 31 den. चीर् *tear, cleave* = Skr. N. चीर (rag), whence Skr. चीरयति, Pr. चीरेद् or चीरद्, H. चीरै.

- 82 comp. चुक् *be finished, cease* = Skr. चुत् + क्त; Pr. चुकर (H. C. 4, 177), H. चुकै. H. C. gives it as a substitute of the Skr. root अम् *fall down, decay*, a synonym of चुत्; so also the commentator to Spt. 323, see Wb. p. 184. The correct derivation from चुत् is given by the commentator on Setubandha 1, 9. The Skr. root चुक् *inflict pain*, X. cl. चुक्कयति, is doubtlessly reintroduced from the Prākṛit. See No. 33.
- 83 comp. चुक् *blunder, miss* = Skr. चुत् + क्त; Pr. चुकर, H. चुकै. This is clearly identical with the former, as regards origin. The original meaning "fall," "drop," (from the truth) would easily lead to "blunder." In this sense it is well-known to Prākṛit; *e. g.*, Spt. v, 323, चुक्कसंकेषा "blundered or missed meeting"; again Spt. v. 199, Setubandha 1, 9, where the commentary correctly explains it प्रमादे देशी इति केचित्, *i. e.*, according to some it is a *desī* word meaning "blundering" (See S. Gdt., p. 157). See No. 32.
- 84 den. चोराव् *steal* = Skr. N. चार or चौर; Pr. चोरावेद or चोरावद, H. चोरावै.
- 85 comp. चौक् *start (from fright)* = Skr. चमत् + क्त, passive चमत्क्रियते (used actively), Pr. चमक्केद or चमक्कर, Ap. Pr. चवक्कर, H. चौकै.
- 86 der. हन् *be strained, filter*, a passive or intransitive derived from हान्, No. 38.
- 87 den. हल् *deceive, cheat* = Skr. N. हल; Skr. हल्लयति, Pr. हल्लेद or हल्लद, H. हल्लै.
- 88 den. हान् *strain, search* = Skr. P. P. P. ह्यन्न (of root ह्यद्), Pr. \*हन्नेद or हन्नेद (Ls. 199) or हन्नद, H. हानै (?).
- 89 den. हाप् *stamp, print*; an active or transitive derived from root हप्; perhaps merely another form of root घाप्; see Appendix Nos. 4 and 13.
- 40 den. हाव् or चाव् *wish* = Skr. N. उत्याव्; Pr. उत्यावेद (cf. H. C. 2, 22) or उत्यावद, H. हावै or (disaspirated) चावै; or from Skr. N. ह्याव्, Pr. ह्यावरद or ह्यावरद, H. चावै (with transferred aspiration) or हावै. As to the elision of initial उ or ह, see my Comp. Gramm. § 173 (cf. Addenda); and as to the change of aspiration, *ibidem* § 132.
- 41 comp. बिटक् *be dispersed, be scattered* = Skr. बिभ्र + क्त; Pr. बिटक्केद or बिटक्कर, H. बिटकै. See No. 46.
- 42 den. बिक् *be vexed, take offence*, a passive or intransitive, derived from R. बीक् or बेक्, No. 46.
- 43 comp. बिडक् *sprinkle* = Skr. व्युड + क्त; Pr. बिडक्केद or बिडक्कर, H. बिडकै. As to the derivation of बिड from Skr. व्युड, see No. 45 बीड; and as to the softening of the final, बीड is to बिड, as ऊड to ओड, q. v.

- 44 den *हीन् sneeze* = Skr N *हिक्का*, Skr *हिक्कापतन*, Pr. *हिक्कोर* or *हिक्कर*, H. *हीन्हे* The word *हिक्का*, however, is itself a compound from *हित् sneezing* and *का*, and the word *हित्* is probably another form of *हुत् sneezing*, from Skr root *हु sneeze*.
- 45 den *होड़* or *हीड़* or *हेड़ sprinkle* = Skr. P P P *स्युह sprinkled*, Pr *हिङ्* (with *हि* for *स्यु*, as in *हिङ्कर* or *हिङ्कर* or *हिङ्कर*, H C 4, 182. 257, see also primary roots Nos 78, 80), Pr *हिङ्गेर* or *हिङ्गेर*, H *हीड़े* or *हीड़े* or *हेड़े* (on disaspiration see my Comp Gramm. § 145, Exc 2, on the *anunāsika*, § 149, and on the change of *ह* to *ए*, § 118) Or from Skt N *सेल्ल* (of root *सिच्*), see primary root No 342
- 46 den. *होड़* or *हेड़ abuse, vex* = Skr P P P *चिप्न abused*, Pr *हेड़ेर* or *हेड़ेर*, H *हेड़े* or *हीड़े* See Nos 27, 42 Probably from *चिप्न* was derived a root *हिट* just as Skt root *कुट्* from *कुल्ल*, the causal of *हिट* would be *हेटि*, just as causal *जे टि* of *कुट्*; whence we should have Pr *हेड़ेर* just as P1 *जोड़ेर*, and H *हेड़े* just as H *जोड़े*. The root *हिट* which would correspond to *कुट्* does not exist in Hindi, except in the compound *हिटक*, see No 41 A similar series of roots are *हुट्* or *हूट्* and *होड़*\* Possibly also Nos 43 and 45, may be derived from *चिप्न*
- 47 den *हीन take away, snatch* = Skt P P P *चिप्न* (of root *चिद्*), Pr *चिप्नेर* or *चिप्नेर*, H *हीनै*
- 48 den *हुट्* or *हूट् be lit off, be released* = Skt P P P. *चिप्न*, Pr *हुत्* (H C 2, 138) or *हुट्* (S C 1, 3, 142 *हूट्*), P1 *हुटेर* or *हुटेर*, H *हुटे* or *हूटे* See Nos 46 and 50 The root *हुट्* or *हूट्* has not been adopted into Sanskrit, except in its causal or transitive form *होड़*†

\* There would be the following series of forms

Skt *युल्ल*, P1 *जुत्* or *जुट्*, Roots Skt *जुट्* P1 *जुह* or *जुह*, H. *जुट* or *जुह*, Caus *जोड़*  
 „ *चिप्न*, „ *हुत्*, „ *हुट्*, „ „ *हिट*, „ *हुट्*, „ *हुट्*, „ *हुट्*, „ *होड़*  
 „ *चिप्न*, „ *चित्*, „ *हिट्*, „ „ *हिट*, „ *हिट*, „ *हिट*, „ *हिट*, „ *हिट*, „ *हिट*, „ *हिट*

The Pr roots in *ह्* would seem to be the original derivatives from the Skr. P P P, they were reintroduced into Sanskrit with one final *ट*, and afterwards gave rise to the alternative Pr root in *ड्*, by the ordinary phonetic change of *ट्* to *ड्*. The two alternative Pr roots in *ह्* and *ड्*, reappear in H as roots in *ह्* and *ड्*. As to the Skr root *हुट्*, see footnote to No 48 The root *हिङ्* appears to have been little used, it is not mentioned among Skr roots, nor does it survive in Hindi, except in *हिटक*, see No 41

† The root *हुट्* does exist in Skr, but it has assumed a somewhat different, though connected meaning “*cut*” (whence H *हुड़ो knife*) The same transition of

- 49 den. **वेद्** *perforate* = Skr. N. **विद्** (of R. **विद्**) ; whence Skr. **विद्भवति**, Pr. **विदेह** or **विदह**, H. **वेदे**.
- 50 der. **बोद्** *release*, an active or transitive, derived from R. **बुद्** No. 48. Compare Skr. root **बोद्**.
- 51 den. **जुगव्** *pair, off labor* (i. e., *assist another with labor, in expectation of similar assistance being returned hereafter*) = Skr. N. **युग्म**, Pr. **जुग्म** (H. C. 2, 78) ; Pr. **जुग्मावेह** or **जुग्मावह**, H. **जुगवै**. The root comes to mean generally : *be provident, be careful of*.
- 52 den. **जताव** *make known, warn* = Skr. P. P. P. **ज्ञत** (of caus. of R. **ज्ञा**) ; Pr. **जतावेह** or **जतावह**, H. **जतावै**.
- 53 den. **जम** *germinate* = Skr. N. **जम्**, Pr. **जम्बोह** or **जम्बर** (H. C. 4, 136), H. **जमै**.
- 54 den. **जीत्** *overpower, win* = Skr. P. P. P. **जीत** (of R. **ज्या**) ; Pr. **जिनेह** or **जिनाह**, H. **जीतै**.
- 55 der. **जुज्** *be joined*, a passive or intransitive, derived from root **जोज्** see No. 57.
- 56 den. **जुट्** *unite* = Skr. P. P. P. **युक्त**, Pr. **जुक्त** (H. C. 1, 42) or **जुट्**, (see Nos. 46, 48), Pr. **जुट्टेह** or **जुट्टेह**, H. **जुटै**. Compare Skr. root **जुट्**.
- 57 der. **जोज्** *join*, an active or transitive, derived from root **जुट्**, see No. 56.
- 58 den. **जोत्** *yoke* = Skr. N. **योक्त**, Skr. **योक्तवति**, Pr. **जोनेह** or **जोनाह**, H. **जोतै**.
- 59 den. **जोह्** or **जोव्** or **जो** *see* = Skr. N. **ज्योतिस्** *eye, sight* ; Pr. **जोएह** (H. C. 4, 422, 6) or **जोएह** (cf. H. C. 4, 332 **जोयतिहे**), H. **जोरे** or **जोवे** or **जोहै** (with euphonic **व्** and **ह्**, see my Comp. Gramm. § 69).
- 60 comp. **झटक्** tr. *twitch*, intr. *shake* = Skr. **झट + क्** ; Pr. **झट्टोह** or **झट्टाह**, H. **झटकै**. As to the derivation of **झट**, see primary root **झाट्** No. 96.
- 61 comp. **झपक्** intr. *spring* ; tr. *throw on, move to and fro, snatch* = Skr. **झप + क्** ; Pr. **झपकोह** or **झपकाह**, H. **झपकै**. Hemachandra 4, 161 notices the corresponding uncompounded verb **झंपह**, but only as an intransitive "move to and fro" (said to be = Skr. **जम्बति**). Hindi and Maráthi have the same uncompounded verb **झांपै**, but as a transitive, "cover with a thatch" (lit., *throw on*, i. e., bundles of

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meaning may be observed in another series of Skr. roots, which also are derived from **जिप्**. The latter becomes in Pr. **जिप्त** (H. C. 2, 127) or **जुप्त** (Spt. v. 278) or **जुड्** ; whence Pr. den. roots **जुह्** or **जुड्** (H. C. 4, 116 **जुड्टेह** and **जुड्टेह** *he breaks*), H. **जुड्** (**जुड्** does not exist). This root **जुड्** as well as the corresponding causal or transitive forms **बोड्** or **बोह्** have been adopted into Sanskrit. See primary root No. 41.

- grass.)\* As to the derivation of झप, see Appendix No. 6. Hindi has an adverb झप *quickly*; it has also another kind of compound root झपद् with the same meaning as झपक्. On these obscure compound in ड roots, see my Comp. Gramm. § 354, 2.
- 62 comp. झलक् *shine, glare* = Skr. झल + छ; Pr. झलकर or झलकर, H. झलकै. As to the derivation of झल, see primary root No. 98.
- 63 den. झाँक् *peep, spy* = Skr. N. ज्ञाञ्ज; Pr. ज्ञाञ्जकर, H. झाँकै (with loss of initial ज्ञ, and disaspiration) ?
- 64 comp. झोँक् *sigh, lament* = Skr. झोन् + छ; Passive झोँक्रीयते (used actively), Pr. झोँकर or झोँकर, H. झोँकै.
- 65 comp. झुक् or झोक् *stagger, nod, bend* = Skr. जुम् (acc. sg. neut. जुप्) + छ; Pr. झुकर, H. झुकै or झोँकै.
- 66 comp. झोक् or झोँक् *throw, cast* = Skr. जेष (or जप्) + छ; Pr. झोँकर, H. झोँकै or झोँकै. As to जो = एव, see my Comp. Gramm. § 122 ?
- 67 der. ठिक् *be propped, stay*, a passive or intransitive, derived from No. 68.
- 68 comp. टेक् *prop, support* = Skr. ताय (of root तै) + छ; Pr. टायकर, H. टेकै ?
- 69 den. ठड् *fix, arrange* = Skr. P. P. P. स्था (of root स्था); Pr. ठडूर or ठडूर, H. ठडै. The hardening of ड् to ठ is probably caused by the influence of the initial ठ. In old Hindi ठडै occurs in the sense of "stopping short", "standing amazed". When the past participle is used as such (not as an element of a denominative verb), the original ड is still preserved in Hindi; thus old Hindi ठाड, modern Hindi ठडा "standing".
- 70 comp. ठडक् or ठिडक् *stop short, stand amazed* = Skr. स्था + छ; Pr. ठडकर, H. ठडकै or ठिडकै. As to the derivation of ठड, see No. 69; as to ड् for ज्ञ, see my Comp. Gramm. § 35.
- 71 comp. ठनक् *jingle, tinkle, &c.* = Skr. स्नन *sounding* + छ; Pr. ठनकर or ठनकर, H. ठनकै. Compare Skr. टंकार *clang, twang, &c.* from ट + छ; ट or ठ means any "sound."
- 72 comp. ठनक् *strut* = Skr. स्तम्भ + छ; Pr. ठनकर or ठनकर, H. ठनकै. Skr. स्तम्भ becomes Pr. स्तम्भ or स्तम्भ (H. C. 2, 9, whence H. चाम् *prop, pillar* and ठाम् *place, residence*. The change of स्तम्भ to स्तम्भ to न may be observed in the primary roots Nos. 117, 118.
- 73 comp. ठसक् *knock, chip* = Skr. तक्ष + छ, see root ठाँस् No. 10. in Appendix. Hindi has an interjection ठस्, imitating the sound of *knocking* or *hammering*; also ठसनी *rammer* (an instrument).
- 74 den. ठसर् *be fixed, remain*, another form of No. 75; possibly arisen by

\* Panjābī has झँवे, with व् for प्; and झाँप् *thatch*, with प् for प्. The former might be referred to the Skr. root झञ्.

a mere transposition, ठङ् *tharh* = ठङ्क् *tharah* = ठङ्क् *thahar* = ठङ्क् *thahar*. Or the element र may be the same as र or ख in ठङ्क् or ठङ्क्, &c. (see my Comp. Gramm. § 854, 2), and ठङ् = Pr. ठङ् = Skr. लब्ध. Hindi has the noun ठङ्क् *place*.

75 den. ठङ् or ठङ्क् *be fixed, be erect, stand* = Skr. P. P. P. लब्ध, Pr. ठङ् (H. C. 2, 39); Pr. ठङ्क् or ठङ्क्, H. ठङ् or ठङ्क्.

76 den. डर *fear* = Skr. N. डर, Pr. डर (H. C. 8, 217); Pr. डर (H. C. 4, 198), H. डर.

77 den. डाङ् *be hot, burn* = Skr. N. दाङ्, Pr. डाङ् (H. C. 1, 217); Pr. डाङ् or डाङ्, H. डाङ्.

78 comp. ढक् *cover* = Skr. N. ष्यक् (acc. sing. neut. ष्यक् *covering*) + ङ; Pr. ढङ् (H. C. 4, 21), H. ढङ्. See primary root No. 105.\*

79 der. डल् or डल् *flow, a passive or intransitive of root ढल् or डर*, see Appendix No. 11.

80 comp. थक् or थक् *be wearied, be fatigued* = Skr. लप् (acc. sing. neut. लप्) + ङ; Pr. थङ् (H. C. 4, 370) or VI. cl. थङ् (H. C. 4, 87, 259; where it is said to be a substitute of Skr. फक्ति *move slowly from fatigue*), II. थङ् or थङ्. In H. C. 4, 16 the root is given as an equivalent of ष्या *stand*; the Bangálí has थक् (pronounced *thak*) *stay, remain*. The original meaning of the Hindi is *to come to a stop* (from fatigue). The Skr. passive लभ्यते (= लप् + लभ्यते) means "to be made firm or rigid, be paralysed, be stopped". The original meaning of "rigidity" is preserved in the Hindi थक् or थक् *a congealed lump, a clot*. The stoppage may be owing to fatigue or to wonder; hence Hindi थक्त् *stopped or wearied or astonished*. Other derivatives of the Hindi root are थक्त् *unwearied*, थक्त् *weariness*, थक्त् *perplexed*.†

81 comp. थप् *strike, slap, tap* from थप् + ङ; as to the derivation of थप्, see root थप् in the Appendix No. 13.

\* It might be also derived, as a primary root, from Skr. तच्, I. cl. तच्ति, Pr. तच्क् = थङ्क् (with transfer of aspiration) = ढङ्क् (softening and cerebralising थ). Compare the roots ठाङ्, ठङ्, ठाङ्, ठाङ् in the Appendix, which show that the Skr. roots तच् and तच् had a tendency in Prákrit to transfer the aspiration (थ) and cerebralise the initial (ठ). The Skr. root तच् means *chipping off* (by striking) and *covering*; a similar change of meaning appears in the Hindi root ढङ् *cover* from Skr. ढङ् *rub, strike*.

† S. Goldschmidt, *Prákritica*, No. 7, p. 5 derives it, as a denominative root, from P. P. P. थङ्क् of a root थङ्क्, which he identifies with the root थङ्क्, and assumes a change of थङ्क् to थङ्क्. This theory is based on three hypothetical steps: the identity of थङ्क् and थङ्क्, the existence of a P. P. P. थङ्क्, the change of थङ्क् to थङ्क्. Pischel in *Benzsenberger's Beiträge* III, 235 derives it simply from a hypothetical Skr. root थङ्क्.

- 82 comp. **चलक्** or **चरक्** *tremble, flutter*; probably a mere various pronunciation of **चरक्** or **चरक्**, q. v.; the interchange of **च** and **ज** is shown by the Pr. **चलद्** and **जलद्** (H. C. 4, 87), and that of **च** and **ज** by **चंभो** and **जंभो** (H. C. 2, 8). There is also a reduplicated root **चलचल्** or **चरचर्** corresponding to **चरचर्** and **चरचर्**.
- 83 comp. **धिरक्** *be set, be settled, well postured* (e. g. in dancing) = Skr. **धिर**+**ञ**; Pr. **धिरज्जे** or **धिरज्जद्**, H. **धिरकै**.
- 84 den. **धिराव्** intr. *settle* (as liquor) = Skr. N. **धिर**. Skr. **धिरायति** Pr. **धिरावेद्** or **धिरावद्**, H. **धिरावे**.
- 85 comp. **धुक्** *spit* = Skr. **धेव** (or **स्येव**) + **ञ**; Pr. **धुजेद्** or **धुजद्**, H. **धुजै**. As to the contraction of **एव** to **उ** or **ऊ**, see my Comp. Gramm. § 122.
- 86 den. **दडक्** or **दौड्** *run* = Skr. N. **द्रव**, Pr. diminutive **द्वड**; Pr. **द्वडेद्** or **द्वडद्**, E. H. **दड्जै** or W. H. **दौड्जै**. In Chāṇḍa's *Prākṛit Lakṣhaṇa* C D, II, 27h, there is noticed a root **डवडव** *run about with lowering face* (**अतिरमसाद् ऊर्द्धमुखस्य इतस्ततो गमने डवडव**); Marāṭhī has both **डवडव** and **डवड** in the same sense; it has also **द्वड** *run*; these two roots are probably identical, the change of initial **द** to **ड** being not uncommon; see H. C. 1, 217.
- 87 comp. **दरक्** intr. *split* = Skr. **दर** + **ञ**; Pr. **दरजेद्** or **दरजद्**, H. **दरकै**.
- 88 comp. **दहक्** intr. *burn* = Skr. **दह** + **ञ**; Pr. **दहजेद्** or **दहजद्**, H. **दहकै**.
- 89 den. **दुख्** intr. *pain* = Skr. N. **दुःख**; Skr. **दुःखयति**, Pr. **दुखेद्** or **दुखद्**, H. **दुखै**.
- 90 comp. **धडक्** *blaze, be hot* (from any passion), *be distressed, tremble* (from fear), = Skr. **दग्ध** + **ञ**, Pr. **दड्जद्**, H. **धडकै** (for **दडकै**, with transfer of aspiration). There is also reduplicated root **धडधड**\*.
- 91 den. **धार** *pour* = Skr. N. **धार**; Pr. **धारेद्** or **धारद्**, H. **धारे**.
- 92 comp. **धौक्** or **धौक्** *blow, breathe upon* = Skr. **धम** + **ञ**; Pr. **धमजेद्** or Ap. Pr. **धमज्जद्**, H. **धौकै**.
- 93 den. **नट्** *dance* = Skr. N. **नर्त**; Skr. **नर्तयति**, Pr. **नट्जेद्** or VI. cl. **नटद्** (H. C. 4, 230. 2, 30), H. **नटै**. The Skr. root **नट** (I. cl. **नटति** or X. cl. **नाटयति**) is adopted from the *Prākṛit*.
- 94 der. **नह्** *flow*, a passive or intransitive, derived from primary root **नञ** No. 186.
- 95 den. **नहाद्** *flee* = Skr. P. P. P. **क्षल** (of R. **क्षल्** *eject*); Pr. **नहद्**, E. H. **नहाटै**. Compare Pr. **पलहद्** (H. C. 4, 200) from Skr. **पर्यल**.

\* Hindī has a word **बड** *bad* and **बड** *firm, strong, sound*. This is probably derived from Skr. **वड** = Pr. **वड** : H. **वड**.

- 96 der. निकस् or निकर् *be pulled out, come out*; a passive or intransitive, derived from root निकास्. See No. 98.
- 97 der. निकस् *be expelled, come out*; a passive or intransitive, derived from root निकास्. See primary root No. 139.
- 98 den. निकास् or निकार् *pull out, eject* = Skr. P. P. P. निष्कृष्ट; Pāli and Pr. निकट्ट, Pr. निष्कट्ट or निक्कालट्ट, W. H. निकालै or E. H. निकारै. As to the change of ड to ट्ट, see my Comp. Gramm. § 115.\*
- 99 den. निखोस् or निखोर् *peel, extract* = Skr. P. P. P. निष्कृष्ट; Pr. निक्कोट्ट (with *o* for *u*, by H. C. 1, 116) or निक्खोट्ट (with transfer of aspiration, as in चक्खोट्ट H. C. 4, 188 = चक्कोट्ट, a denominative of च्चकुट्ट *extracted*).
- 100 den. निकोस् *grin* = Skr. N. निकुञ्जय (from root नि + कु + जि); Skr. निकुञ्जयते, Pr. निक्कोस्से or VI. cl. निक्कोस्स (cf. H. C. 1, 116), H. निकोचे. See my Comp. Gramm. § 148.
- 101 den. निगल् *swallow* = Skr. N. निगल; Pr. निगले or VI. cl. निगलर, H. निगले. It might, however, be a primitive root = Skr. नि + ग्, VI. cl. निगलति, with change of र to ल.
- 102 den. निपट् *terminate* = Skr. N. निष्पत्ति (from root निष् + पट्); Pr. निष्पट्ट or VI. cl. निष्पट्ट, H. निपटै (?). As to the change of dental त to cerebral ट्ट, compare Pr पट्ट for Skr. पतनं, Vr. 8, 23; cf. also Pr. पट्ट for Skr. पतति Vr. 8, 51.
- 103 der. निबस् or निम् *be accomplished, succeed*, a passive or intransitive root, derived from the primary root निबाच्, No. 146.
- 104 den. परट् or पेट् *enter* = Skr. P. P. P. प्रविष्ट, Pr. परट्ट (H. C. 4, 340); Pr. परट्ट or VI. cl. परट्ट, E. H. परटै or W. H. पैटै.
- 105 den. पक् *ripen* = Skr. P. P. P. पक्, Pr. पक् (H. C. 2, 79); Pr. पक्के or पक्कर, H. पक्के.
- 106 den. पक्स् *seize* = Skr. P. P. P. प्रकृष्ट; Pr. पक्कट्ट (cf. H. C. 4, 187), H. पक्के (for पक्कट्टै, with lost aspiration, as in root गाड् No. 16, उवाड् No. 6, डाड् No. 75, and others).
- 107 den. पञ्चताव् *repent* = Skr. N. पञ्चात्मप; Pr. पञ्चतावे or VI. cl. पञ्चतावर, H. पञ्चतावे.
- 108 den. पट् *be paid, be roofed, be watered* = Skr. N. पत्र or पट् or पट; Pr. पट्ट or VI. cl. पट्ट, H. पटै. Skr. पत्र is any "vessel", used for irrigating; पट् is the table or leaf on which the accounts of payments are kept; पट means a "roof."

\* So also Bs. I, 354. III, 58. The Hindī root निकास् is, of course, referable to the Skr. root निष् + कस्; but the latter is most probably itself adopted from the Prākṛit; Skr. निष्कासयति = Pr. निक्काले. The Pr. form निक्कालेहि, quoted by Bs. III, 58, is misspelt for निक्कालेहि.

- 109 den. पनम् *expand, grow, prosper* = Skr. N. प्रपञ्च (of root प्र-पञ्च्.), Skr. प्रपञ्चयति, Pr. पपञ्चद् or पपञ्चद् (cf. Pr. पञ्चाञ्चा = Skr. पञ्चाञ्जल, H. C. 2, 42), H. पनई (transposed from पपने, see my Comp. Gramm. § 133, see also primary roots Nos. 165, 166).
- 110 den. पनियाव् *irrigate* = Skr. N. पानीय, Pr. पाणिय (H. C. 1, 101), Pr. पाणियावेद् or पाणियावद्, H. पनियावै (see my Comp. Gramm. § 25).
- 111 den. परिस् or परस् *touch* = Skr. N. स्पर्श, Pr. फरिस् (Vr. 3, 62); Pr. फरिस्द् (H. C. 4, 182), H. परिसै or परसै (with lost aspiration, and change of *i* to *a*; see my Comp. Gramm. §§ 58 note, 130).
- 112 den. पलट् or पलट् intr. *turn over* = Skr. P. P. P. पर्वत्, Pr. पलट् or पलट् (Vr. 3, 21. H. C. 2, 47), Pr. पलटद् or पलटद् (H. C. 4, 200), H. पलटै or पलटै. In H. C. 4, 200. 258 पलट् and पलट् are spelled so; see my Comp. Gramm. § 161.
- 113 den. पहिचान् or पञ्चान् *recognise* = Skr. N. परिचयन; Pr. परिचयवेद् or परिचयवेद्, H. पहिचानै or पञ्चानै (for परचानै; with elided *र* and inserted euphonic च्, see my Comp. Gramm. §§ 69, 124) (?).
- 114 der. पिहन् or पहिन् intr. *dress, put on*, a passive or intransitive, derived from the primary root पिहनाव् or पहिनाव्, No. 165.\* See also primary root पहिर् No. 166.
- 115 comp. पिचक् *be squeezed, be shrivelled* = Skr. पिच + छ; Pr. पिचवेद् or पिचवेद्, H. पिचकै Compare Skr. पिचिड *squeezed*; and as regards the derivation of पिच or पिच, see primary root पौच No. 175. The word has been adopted into Skr. from the Prākṛit.†
- 116 den. पिक्ल् or फिक्ल् *slip* = Skr. N. पिक्कल or पिक्कल slippery; Pr. पिक्कवेद् or पिक्कवेद्, H. पिक्कलै or फिक्कलै. (transferring the aspiration to प and changing च् to च; see my Comp. Grammar § 11). See No. 125.
- 117 der. पिट् *be beaten*, a passive or intransitive, derived from root पीड No. 119.
- 118 der. पिल् *be beaten, bruised*, a passive or intransitive, derived from root पील्, No. 121. See also No. I, 184.
- 119 den. पीट् *beat* = Skr. P. P. P. पीट्; Pr. पीटद् (Spt. 173) or पीटद् (with ट् for ट्, as in पलटद् for पलटद् (H. C. 4, 200), H. पीटै. See No. 121.
- 120 den. पुकार् *call, shout* = Skr. N. सूक्कार or फूक्कार or पूक्कार; Pr. फुकारेद्

\* In Bengālī the root is पिनच्, which is a denominative of the Skr. P. P. P. पिनच् *dressed*. Possibly the Hindi root may be explained in the same way by a further change of च् to च.

† In the Skr. word चिपिट *pressed down* a metathesis of प and च appears to have taken place.

or पुकारेद or पुकारद, H. पुकारै. A similar change of ष to य, in root परिष् No. 111. An intransitive or passive form of this root occurs in the old Hindī of Chand's Prithirāj Rasau: पुकार be called.

121 den. पेष् *squeeze, beat* = Skr. P. P. P. पिष्ट; see primary root No. 184.

122 den. पुन् *revile*, perhaps = Skr. N. पुष् *blessed*; euphuistically.

123 comp. फटक् tr. *separate, winnow*, or intr. *be separated* = Skr. स्रट् + ङ; Pr. फट्कोर or फट्कार, H. फट्कै. The Pr. doubles the radical ट; see primary root फट् No. 186.

124 comp. फरक् or फडक् *tremble* = Skr. स्फर + ङ; Pr. फरकोर or फरकार, H. फरकै or फडकै. The reduplicated root फरफर् or फुरफुर also occurs. See roots घरक् No. 32 and खरक् No. 14.

125 den. फिसल् *slip, slide*, see No. 116. For a similar transfer of aspiration on account of change of ह to स, see root ठस् in Appendix No. 8.

126 comp. फूक् *blow* = Skr. फूत् + ङ; Pr. फूकोर or फूकार, H. फूकै. See H. C. 4, 422, 3. फुक्खित्त, and Spt. 178 फुक्कतष.

127 der. फुक् *be blown*, a passive or intransitive, derived from root फूक् No. 126.

128 den. बरद् or बैट् *sit* = Skr. P. P. P. उपविष्ट, Pr. उवद्द (like परद्, No. 104) or बोरद् (cf. H. C. 1, 173), H. बरटै or बैटे (as to change of ओ to ब, see my Comp. Gramm. § 71). The initial ब for व is somewhat anomalous, as such an "expansion" व does not ordinarily harden to ब. Another way of explaining the Hindī बरद् is to assume that the initial उ of Pr. उवद्द has been dropped (so in my Comp. Gramm. § 173, and Bs. I, 179. III, 38); but this does no more obviate the anomaly; for a Pr. व, softened from Skr. प, does not, as a rule, harden in Hindī.

129 comp. बक् *talk, chatter* = Skr. वाच् + ङ; Pr. बक्कर, H. बकै. Or possibly a mere corruption for बुक्, Pr. बुक्कर or बुक्कर (H. C. 4, 98), Skr. बुक्कति or बुक्कयति a comp. of ब्रू + ङ. Hindī does not possess the form बुक्, but it has a derivative of it, बुक्काव्; Maráthi has both बुक् and बुक्कल्.

130 den. बच् *read, recite* = Skr. N. वाच; Pr. बचर, H. बांचै.

131 comp. बरक् *go beyond bounds, stray* = Skr. बरिष् + ङ; Pr. बरिक्कोर or बरिक्कार, H. बरकै.

132 der. बिचर् *be spread*, a passive or intransitive, derived from the primary root बिचार No. 225.

133 den. बिराव् *mock, jeer* = Skr. N. विराव *sound, noise*; Pr. बिरावेद or बिरावर, H. बिराव.

134 den. बिखद् *become bad*, perhaps connected with P. P. P. बिखन्वित (बिखन्त ?) *wasted*.

135 den. बीट् *scatter, spill* = Skr. P. P. P. ब्रूय; Pr. बिह (for बिह, as पकह for पकड, see No. 112); Pr. बिहेर or बिहद, H. बीटै.

- 136 den. बीत् *pass* = Skr. P. P. P. बीत्, Pr. बिन् (like निबिन् for Skr. निबिन्, H. C. 2, 99; otherwise the preservation of न is not explainable); Pr. बिनेद् or बिनद्, H. बीने.
- 137 den. वेढ् *enclose, surround* = Skr. वेह्, Causal वेह्यति or I. ol. वेहते, Pr. वेहेद् (H. C. 4, 51) or वेहुर (H. C. 4, 221), . H. वेढै. The root is probably a denominative of an anomalous P. P. P. or some other derivative of the root बिम् or बिप्. The so-called Causal shows its denominative form.
- 138 den. बडराव् or बीराव् *go mad* = Skr. N. बातुल; Pr. बाडलावेद् or बाडलावद्, H. बडलावे or बीरावे. See my Comp. Gramm. § 25.
- 139 den. भाग *flee* = Skr. P. P. P. भग्, Pr. भग् (cf. H. C. 4, 354), Pr. भग्नेद् or भग्नेद्, H. भागे.
- 140 den. भीग् or भीग् *be wet* = Skr. अभ्यङ्; Pr. अभिग्नेद्, or अभिग्नेद्, H. भीगै or भीगै (P). As to the loss of initial अ, see my Comp. Gramm. 172. Compare the primary root भीज् in the Appendix No. 21.
- 141 der. भुज् *be fried, be cooked, a passive or intransitive, derived from भूज्* No. 143.
- 142 den. भूल् or भोल् or भोर् *forget, blunder* = Skr. P. P. P. भृह; Pr. भृहद् (H. C. 4, 177), W. H. भूले or भोले, E. H. भूरै or भोरै. Skr. भृह = Pr. भृहु = भृह्व = भृह; the change of *u* to *o* caused by the labial *bh*. As to the change of *u* to *o*, see my Comp. Gramm. § 148.\*
- 143 den. भूज् *fry, cook* = Skr. P. P. P. भूर्ष (Pan 8, 2. 44); Pr. भृजेद् or भृजेद्, H. भूजे.
- 144 den. मढ् *cover, gilt (i. e. encase by rubbing on)* = Skr. P. P. P. षड्, Pr. मड् or (disaspirated) मड्; Pr. मडुद् or मडद् (H. C. 4, 126), H. मढै. The Skr. root मढ् *cover* is adopted from the primitive Prākṛit or Pāli मड् (= षड्), whence मड् *a covering, hut*, H. मड् or मड्. Similarly are formed the roots कढ्, वेढ्, &c.
- 145 den. मत् *consult* = Skr. N. मन्त्र; Pr. मन्तेद् or मन्तद् (cf. H. C. 4, 260 मन्तिदे), H. मतै (with elided nasal, see my Comp. Gramm. § 143).
- 146 der. मिड् *be effused, cease to exist, a passive or intransitive, derived from the root मेड्*, No. 153.
- 147 der. मुंढ् *be shaved, a passive or intransitive, derived from the primary root मुंढ*, No. 284.
- 148 der. मुंद् *be closed, a passive or intransitive, derived from the root मुंद्*, No. 151.

\* This derivation I owe to S. Goldschmidt, *Prākṛitica*, No. 8, p. 9. Formerly, looking upon भोल् or भोर् as the more primitive form, I was inclined to consider it a denominative of Skr. भनद्, whence comes Hindi भोरा or भोला a *simpleton*.

- 149 den. मृ *die* = Skr. P. P. P. मृत्, Pr. मृच (H. C. 4, 442); Pr. मृचर, H. मृरे.
- 150 den. मूत्र *discharge urine* = Skr. N. मूत्र; Skr. मूत्रयति, Pr. मुत्रेद or मुत्रद, H. मूत्रे.
- 151 den. मुद्र *close* (lit. with a seal ring) = Skr. N. मुद्रा; Skr. मुद्रयति, Pr. मुद्रेद or मुद्रद, H. मुद्रै. See H. C. 4, 401 हिषी मुद्र *sealed*.
- 152 den. मून् *be silent* = Skr. P. P. P. मून् (of root मृ); Pr. मूणेर or मूणर, H. मूने, (or from N. मौन)
- 153 den. मेढ *efface* = Skr. P. P. P. मृह, Pr. मिह्रेद or मिह्र (disaspirated for मिह्र, cf. Pāli मड् or मड = मृह), H. मेढै, (with *e* for *i*, see my Comp. Gramm. § 148).
- 154 den. मौल or मौर् *blossom* = Skr. N. मौल; whence मौलयति, Pr. मौलेद or मौलद, W. H. मौले or E. H. मौरै.
- 155 den. मौलाव् or मौराव् *blossom* = Skr. N. मौल; Pr. मौलावेद or मौलावद, W. H. मौलावै or E. H. मौरावै.
- 156 den. रम् *be attached* = Skr. P. P. P. रम्, Pr. रम्य (H. C. 2, 10); Pr. रम्येद or रम्यद, H. रमै.
- 157 den. रङ् *dye* = Skr. N. रङ्ग; Skr. रङ्गयति, Pr. रङ्गेद or रङ्गद, H. रङ्गे.
- 158 der. रक् *be hindered*, a passive or intransitive, derived from root रोक् No. 162.
- 159 der. रध् or रद् *be restrained*, a passive or intransitive, derived from the primary root रध् No. 298.
- 160 den. रुद or रुद् *be angry* = Skr. P. P. P. रुह, Pr. रुह (H. C. 4, 414) or रुहु, Pr. रुह्रेद or रुह्रद, H. रुढै or रुह्वै.
- 161 comp. रेक् *bray* = Skr. रेष् (acc. sg. neut. रेड्) + ङ; Pr. रेक्केद or रेक्कर, H. रेक्कै.
- 162 comp. रोक् *hinder* = Skr. रध् (acc. sg. neut. रन्) + ङ; Pr. रक्केद or रक्कर, H. रोक्कै.
- 163 der. रोप् *stop, plant*; a transitive or active, derived from primary root रप्, No. 295.
- 164 den. लंगड् *limp* = Skr. N. लङ्ग, Pr. diminutive लंगड; Pr. लंगडेद or लंगडद, H. लंगडै.
- 165 den, लव् or लौ *reap* = Skr. N. लव; Skr. लवयति, Pr. लवेद or लवद, H. लवै or लौरे.
- 166 comp. लुक् *disappear, conceal oneself* = लुप् + ङ; Pr. लुक्कर (H. C. 4, 55), H. लुक्कै. The word लुप् properly means "dropping out", "elision"; it is derived from the Skr root लुप् *break*. This original meaning of the root is still preserved by the Pr. लुक्कर, which means both *break, cut of*, (H. C. 4, 116, where it is said to be =

- Skr. लुप्) and *disappear, conceal oneself* (H. C. 4, 56, where it is given as an equivalent of the Skr. निह्नी) \*
- 167 den. लुभाद् or लुहाद् *covet, be enamoured with* = Skr. N. लोभ; Pr. लोभावद् or लोहावद्, H. लुभावै or लुहावै, (with *u* for *o*, see my Comp. Gramm. § 25).
- 168 der. सज् *be adorned, be prepared*, a passive or intransitive, derived from root सज्, see Appendix No. 24.
- 169 comp. सटक् or सडक् *get away, disappear, conceal oneself* = Skr. सज् or सड् + छ; Pr. सड्कर or सडकर, H. सटकै or सडकै. The word सज् means *covering, concealment*. The root सड् becomes सज् in Pr.; see Vr. 8, 51. H. C. 4, 219.
- 170 der. सध् *be settled*, a passive or intransitive, derived from the primary root साध् No. 336.
- 171 den. समुहाव् *be in presence of* = Skr. N. संमुख; Pr. संमुहावेद् or संमुहावद्, H. समुहावै.
- 172 comp. सरक् *be moved, move* = Skr. सर + छ; Pr. सरकर or सरकर, H. सरकै. Possibly it is a mere variety of the root सडक्.
- 173 den. सराप् *curse*, denom. made from the Hindi सराप a corruption of the Skr. श्राप; see my Comp. Gramm. § 135.
- 174 der. साठ or साँढ् or साँढ् *combine*, a transitive or active, derived from the primary root संढ, No. 323.
- 175 den. सील् *moisten* = Skr. N. शीतल; Pr. सीललेद् or सीललद्, H. सीलै. on the absorption of *a* after *i*, see my Comp. Gramm. § 97.
- 176 der. सुषर् *be correct, mend*, a passive or intransitive, derived from the primary root सुषार्, see No. 346.
- 177 den. सुहाव् *be pleased or give pleasure* = Skr. N. सुख; Pr. सुहावेद् or सुहावद्, H. सुहावै.
- 178 den. सुहाव् *be beautiful or make beautiful* = Skr. N. सोम; Skr. शोमयति, Pr. सोहावेद् or सोहावद्, H. सुहावै. This might, however, be a primary root, from the causal of root शुम्.
- 179 den. सुख् or सुख् *be dry* = Skr. N. शुष्क, Pr. सुखेद् or सुखलद्, H. सुखै or सुखै.
- 180 den. सुत् *sleep* = Skr. P. P. P. सुप्त; Pr. सुतेद् or सुनद्, H. सुतै.
- 181 den. सेत् or सेत् *adjust* = Skr. P. P. P. समाहित, Pr. समाहित (cf. H. C. 2, 99 निहित = Skr. निहित), Ap. सभाहित or सभाहित, H. (contracted) सेत; whence Pr. समाहितद्, H. सेतै or सेतै.
- 182 comp. सग् *evacuate* = Skr. सद् + छ; Pr. सगद्, H. सगै (for सगै) ?

\* The root लुप् might also be derived from लुप् + छ, from the root लुप् which (like लुप्) means both *cut off* and *disappear*. Or it might be derived from लुप् + छ; the root लुप् meaning *become invisible*.

- 183 comp. बकाव् or बंकाव् *bawl, drive away or keep off* (with shouts) = Skr. बक् + छ; Pr. बकावेद् or बंकावेद्, H. बकावे or बंकावे. This is a pleonastic form of No. 187.
- 184 den. बंकार् *bawl, drive away or keep off* (with shouts) = Skr. बकार् ; Skr. बकारयति, Pr. बकारेद् or बंकारेद्, H. बंकारे. Connected with roots Nos. 183 and 187.
- 185 हन् *slay* = Skr. P. P. P. हन्, Pr. हन् (like निदिधु H. C. 2, 99); Pr. हनेद् or हनद्, H. हने.
- 186 comp. हलक् *move* = Skr. हल + छ; Pr. हलकेद् or हलकद्, H. हलके.
- 187 comp. हाक् *bawl, drive* (with shouts) = Skr. हक् + छ; Pr. हकेद् or हकद् (H. C. 4, 134), H. हांके. See Nos. 183, 184. Probably connected with root भल् or भंज or भाव् *talk* + छ.
- 188 den. हार् *lose, be beaten, be unsuccessful* = Skr. N. हार, Pr. हारेद् or हारद्, H. हारे. H. C. 4, 31 has हारवद् (for हारावद् by H. C. 3, 150), said to be = नञति; it is merely a pleonastic form of हारे. Hindî has हरावे or हिरावे.
- 189 comp. धौक् *blow* = Skr. धम + छ; Pr. धमकेद् or धमकद्, Ap. धवँकद्, H. धौके (for धौके). See No. 92.

#### APPENDIX.—Primary Roots.\*

- 1 ऐच् or ऐच् *pull, attract* = Skr. आ + छप्, future आकर्ष्यति (used in the sense of the present), Pr. आयंक्द् or आरंक्द् (H. C. 4, 187), H. ऐच् or ऐच् (with loss of aspiration). See introductory remarks, pp. 39, 40. This root occurs in the shortened form अच् both in Pr. (H. C. 4, 187 अचद्) and in old Hindî (Prithiraj Rasau 27, 38 अच्); see No. 2.
- 2 वैच् or वैच् or वैच् or वैच् *pull* = Skr. छप्, future ऋष्यति (used in the sense of the present); Pr. कश्च्द् or कश्च्द्, H. वैचे, वैचे or वैच्, वैच् (with transfer of aspiration, see my Comp. Gramm. 132). On the inserted nasal, see *ibidem* §§ 149, 158, H. C. 1, 26, 28. On the change of *a* to *ai* or *e*, see my Comp. Gramm. § 148; here it occurred by assimilation to root ऐच् or ऐच् No. 1. See introductory remarks pp. 39, 40. In old Hindî this root occurs in the form अच्, which is much nearer the original Prākṛit form कञ्; and corresponding to it, the old Hindî has a root-form अच् which has evidently been modified from the original form ऐच् (see No. 1), in order to assimilate it to अच्; just as the original form अच् has

\* These are roots which I was at first inclined to consider to belong to the secondary class.

been modified to **रें** in order to assimilate it to **रें**. Thus the two forms **रें** and **रें** occur in the Prithirāj Rasau 27, 88.

बां मंगोल कलारी बीस डबी बर रें ।

बीदेरी सभाज बाज बरि प्राज रु रें ॥ i. e.,

"The Mangol Khán Lalari draws twenty daggers, and the four-sworded Sabbaj pulls out the enemy's life with his arrows."

- 3 **बां** *vomif, let go, release* = Skr. **वृद्**, I. cl. **वर्दति**, Pr. **वडुर** (H. C. 4, 91), H. **बां**. The root is also spelled **बां**; and it might be derived from **वृद्**, VII. cl. **वृदति**, Pr. **वडर** or **वडर**, H. **बां** or **बां** (as Pr. **भंजर** for Skr. **भजति**). It might also be derived from the Skr. denominative root **वर्द्**, X. cl. **वर्दयति**; as it seems to have been done in H. C. 2, 36 (**वडुर** from **वर्दि**).

- 4 **बप** *be pressed down, be stamped, be printed* = Skr. **चंप**, I. cl. **चम्यति**, Pr. **चंपर**, H. **बपे**. Or perhaps from **चम**, IV. cl. **चाम्यति**.\*

- 5 **भां** or **भां** or **भां** *sigh, chatter (wildly), lament, be sorry for* = Skr. **धां**, I. cl. **धांति**, Pr. **भांर** (H. C. 4, 140), H. **भां**, **भां** or (disaspirated) **भां**. As to the change of **ध** to **भ**, compare Pr. **भां** for Skr. **धजः** (H. C. 2, 27). As to the meaning, compare the English "croak."†

- 6 **भां** *throw on, cover* = Skr. **चप** *throw*, Passive **चप्यते** (used actively), Pr. **भांर**, H. **भां**. The **भ** for **च** is as in **भिजर** for **चियते** H. C. 2, 3, and the inserted anusvára, as in **जंपर** (H. C. 4, 2. 1, 26, for **जयप**). Or it might be derived from Skr. **चपि** + **च**, Causal **चपयति**, Pr. **भांर** or **भांर** (for **चजभांर**, with loss of initial **च** see my Comp. Gramm. § 172).

- 7 **ठक्** *knock, hammer* = Skr. **तच्**, I. cl. **तचति**, Pr. **ठक्कर** (with **ठ** for **त** as in **ठगरो** H. C. 1, 205), H. **ठकै** (for **ठक्** with transfer of aspiration). Compare Skr. **टक्कर**. See No. 9.

- 8 **ठां** *ram, hammer* = Skr. **तच्**, I. cl. **तचति**, Pr. **ठक्कर** (as to **ठ** for **त**, see H. C. 1, 205), H. **ठां** (for **ठक्**, with transfer of aspiration from **च** to **ठ**, and change of **च** to **स्**, see my Comp. Gramm. §§ 11, 132). See No. 10, also Nos. 7 and 9.

- 9 **ठां** or **ठां** *ram, hammer, drive in, (nail, &c.)* = Skr. **तच्**, I. cl. **तचति**, Pr. **ठक्कर** (as to **ठ** for **त**, see H. C. 1, 205), H. **ठां** or **ठां** (for **ठां**, with transferred aspiration). See No. 7.

- 10 **ठां** or **ठां** *ram, hammer* = Skr. **तच्**, I. cl. **तचति**, Pr. **ठक्कर** (cf. H. C. 1, 205), H. **ठां** or **ठां** (for **ठां**). See No. 8.

\* The root **च्य** also might produce a Pr. passive (used actively) **च्यर**, analogous to **चिपर** (H. C. 4, 257).

† This verb is noted by Hemachandra not less than five times; in 4, 140 as = **चंप** *repent*; in 4, 148 = **चिपर** *lament* or *prattle*, in 4, 156 = **उपाचम** *scold*, in 4, 291 = **निःचप** *sigh*, and in 4, 259 = **भां** *talk*.

- 11 **बाह्** or **डार्** *send forth, pour out, cast*, a modification of **बाह्**, No. 14 *q. v.*, cerebralisation transferred to the initial **ब** from **बृ**.
- 12 **बप** *fix, settle* = Skr. **बभू**; Passive **बभूयते** (used actively), Pr. **बप्यद्** (formed similarly to **हियद्** from **बुध्यते** H. C. 4, 257), H. **बपे**. See footnote on p. 46; **भ्य** = **ब** = **व** = **प**.
- 13 **बाप** or **उप** *slap, strike, pat* = Skr. **बुध्**, Passive **बुध्यते** (used actively), Pr. **बप्यद्** or **उप्यद्**, H. **बापे** or **उपे**. See footnote on p. 46; **ह्य** = **भ्य** = **ब** = **व** = **प**.
- 14 **बाह्** *send forth, pour out, cast* = Skr. **भाह्**, I. cl. **भाहते**, Pr. **बाहर्** (H. C. 4, 79), H. **बाहै**. See No. 11. The Skr. **भाह्** is adopted from the Pr., and is probably a denominative of **भ्रह्**, P. P. P. of **भ्रज्** *glide, flow*, Pr. **बहृ** = **बहु** = **बहृ**.
- 15 **फलंग्** *leap* = Skr. **प्र+लंघ्**, I. cl. **प्रलंघति**, Pr. **पलंगर**, H. **फलंगै** (with transfer of aspiration).
- 16 **फेक्** or **फीक्** *hurl, fling, throw away* = Skr. **प्र-हृष्**, Future **प्रेष्यति** (used in sense of present), Pr. **पेक्खर** or **पेखर**, H. **फेकै** or **फीकै** (with transfer of aspiration).
- 17 **विन्** *weave* = Skr. **वृ**, IX. cl. **वृणाति**, Pr. **विण्णर**, H. **विनै**; see No. 19; also No. I, 237. The Skr. root for *weave* is **वे**, I. cl. **वयति** or IV. cl. **जयते**; it seems impossible to derive the H. root **विन्** from it; but the roots **वृ** and **वे** are probably connected; both mean *cover*.
- 18 **विह्** *be spread* = Skr. **वि-क्षु**, Passive **विक्षिद्यते** (for **विक्षीर्यते**; like **क्षिद्यते**, **त्रियते**), Pr. **विक्खर** or **विक्खर**, H. **विहै**. Compare Pr. **विक्खिणं** in Chanda 2, 21 for Skr. **विक्षीर्यं**.
- 19 **वुन्** *weave* = Skr. **वृ**, V. cl. **वृणोति**, Pr. **वुण्णर**, H. **वुनै**, formed like **सुन्** No. I, 347. See No. 17.
- 20 **वोह्** *load* = Skr. **वह्**, Passive **वह्यते** (used actively) or Causal Passive **वाह्यते**, Pr. **वुव्णर** (cf. H. C. 4, 245 **वुव्णर**), H. **वोहै**.
- 21 **भौज्** or **भौज्** *be wet* = Skr. **भुजि** + **थंज्**, Passive **भुज्यन्ते**, Pr. **भुजिक्खर**, H. **भौजै** or **भौजै** (with loss of initial **भ**; see secondary root **भौज्** No. 140).
- 22 **भूक्** or **भौक्** or **भौक्** *talk foolishly, bark* = Skr. **भृष्**, Future **भृष्यति**, Pr. **भुक्खर** (H. C. 4, 186, with disaspiration for **भुक्खर**), H. **भूकै**, &c. The original aspirate form **भोहै** occurs in Hindī. There is an identically spelled root, meaning *thrust, drive*, which probably has a different origin and may be a compound root.
- 23 **भेज्** *send* = Skr. **भुजि** + **वज्**, Passive **भुज्यन्ते** (used actively), Pr. **भुजिक्खर**, H. **भेजै** (with loss of initial **भ** and change of *i* to *e*, see my Comp. Gramm. §§ 172, 148. As to the change of *ya* to *i*, see *ibidem*, § 121).
- 24 **साह्** *adorn, prepare* = Skr. **संज्**, Passive **सज्यते** (used actively), Pr. **सज्जद्**, H. **साहै**. The Skr. root **सज्** has been adopted from the Prākṛit.

## ABBREVIATIONS.

|                                                                       |                                                               |
|-----------------------------------------------------------------------|---------------------------------------------------------------|
| Bs. = Beames' <i>Comparative Grammar</i> .                            | S. B. = Setubandha (ed. S. Goldschmidt).                      |
| Cw. = Cowell's edition of the <i>Prākṛita Prakāṣa</i> .               | S. C. = Śubha Chandra's <i>Prākṛit Grammar</i> .              |
| DL. = Delius' <i>Radices Praeriticae</i> .                            | S. Gdt. = S. Goldschmidt's edition of the <i>Setubandha</i> . |
| E. M. = E. Müller's <i>Beiträge zur Grammatik des Jaina-Prākṛit</i> . | Spt. = Saptasataka des Hāla (ed. A. Weber).                   |
| H. C. = Hema Chandra's <i>Prākṛit Grammatik</i> (ed. Pischel).        | T. V. = Trivikrama's <i>Prākṛit Grammar</i> .                 |
| K. I. = Kramad Iṣvara's <i>Prākṛit Grammar</i> .                      | Vr. = Vararuchi's <i>Prākṛit Grammar</i> .                    |
| R. M. = Dr. Rajendralala Miṭra's <i>Prākṛit Vocabulary</i> .          | Wb. = Weber's edition of the <i>Saptasataka</i> .             |
|                                                                       | G. = Gujarāṭī. S. = Sindhī.                                   |
|                                                                       | M. = Marāṭhī.                                                 |

*Coins supplementary to Thomas' Chronicles of the Pathan kings.*—By  
C. J. RODGERS.  
(With two Plates.)

The "Chronicles of the Pathan kings" is a very full work. But it is an enlargement of a smaller previous work. Further search brought more coins to light, and the description of these coins has swollen the original treatise to its present size. But large though the work be, it is not *exhaustive*. Finality in our knowledge of the coins of the Pathans has not yet been attained. Continued search will bring out still further coins which from time to time will have to be described. Owing to the nature of my duties I have few opportunities of obtaining fresh coins, but as I have during the past year come across about forty unpublished ones, I thought I might venture to put them forward as a small contribution to a further knowledge of the coins of India.

The word *a'dl* figures largely on the coins of the Gaznī rulers. In some modern coins this word occurs together with the sword on several coins of towns in Afghanistan. It must have been for the reason, that might is right, that the early conquerors of India stuck this word on their coins. In Plate V, Nos. 1 and 2 have *a'dl* on the obverse and *mumallikī* on the reverse. I am inclined to ascribe this coin, to *Muhammad Sām* or his general *Eibek*. The word I have transliterated as *mumallikī* may be *mumlakat*. No. 6 I regard as a coin of Muizz-ud-dīn Muhammad Sām. The word Muizz on this coin is written more like the same word on the coins of Eldoz and of Muhammad Sām, than that on the coins of Muizz-ud-dīn Kaikubad or Muizz-ud-dīn Bahram Shāh. There is a coin in the "*Ariana Antiqua*," Pl. XX. fig. 14 which is not mentioned by Thomas. Now I got a good specimen of this same coin from Neshāpūr with a lot of the coins of A'la-ud-dīn Khwārizmī. A glance at No. 15

of Plate V, will show that this very king A'la-ud-dín struck coins of the very same type, using the square area for his name and titles and dividing the latter similarly to Muizz-ud-dín. No. 7, Pl. V, I claim also for Muhammad Sâm. It has Muizzí on obverse and on reverse in Hindí, Sri Samanta Deva.

Nos. 3 and 4, Pl. V, are undoubtedly new types of Shams-ud-dín Altamsh. No. 3 has obv. *a'dl*, rev. *Shamsí*. No. 4 has the same with a star underneath each word. Neither has any ornament.

No. 9 is, I believe, also Shams-ud-dín's. The star seems to indicate this. *A'dl i Sultan ul Muazzim*, the inscription on the obverse is found also on a large quantity of coins of size similar to this one of which Thomas takes no notice. But the *Zarḍ ba Lahore* with star above it is not on them. They have always *Zarḍ ba hazrat Dehli*. No. 9 is to me unique. But the other kind I mention are very common indeed. In my own small collection I have no less than 12 duplicates. One of them has *A'dl i Sultán i Muazzim*; the *alif* and *lám* are altogether missing.

No. 10 is undoubtedly Shams-ud-dín's coin. *Obverse: A'dl us Sultán (ul A'zim)*; *Reverse: (Sha)ms ud Dunya (wa) ud dín*. This is a very coarse coin.

Nos. 11, 12 and 13 are I think Shams-ud-dín's. The obverse and reverse are simple *A'dl* and *Dehli*. No. 11 has these words in square areas; No. 12 in round ones with ornaments; No. 13 in a hexagonal star, with dots in the angles.

No. 5 is a very rare coin weighing only the same as No. 109 in Thomas, and half the weight of his No. 52, the inscriptions of which latter coin it possesses. So we may regard this coin as the smallest hitherto discovered of Shams-ud-dín's. It is exceedingly rare as is the one double its size. Thus in all I have had the pleasure of unearthing no less than 10 new types of coins of Shams-ud-dín.

No. 8 I ascribe to *Reziakh*. In the rayed circle is the name *Reziakh*. On the reverse is the *bull* with Samanta Deva above it in Hindí. The whole coin is similar to No. 7 of the same plate.

No. 14, Plate V is evidently a coin of the same king the No. 15 belongs to. And No. 15 is obv. *A'la ud Dunya*, rev. *Wa ud dín*. This is a coin of A'la ud dín Khwarizmí. No. 14 has similar inscriptions to those on No. 5; but the fortunate discovery of No. 15 settles the ascription.

No. 16 is a new coin of the same king. In the central area is the word *Sultán* and on the margin *Ul A'zim A'la ud Dunya wa ud dín Muham-mad (bin us Sul)tán*. Reverse: the *Kalimah*. The whole is in Kufic characters.

Not one of these three coins is in the British Museum or is noticed by Thomas.

No. 17 is a coin of Fīroz Sháh Zafar, son of Fīroz Sháh. The obverse has on it in square area Fīroz Sháh. The margin reads *Zafar ibn Fīroz Sháh Sultán*, the reverse has *naib i amir ul Mominín* 791. No. 18 is exactly the same in date and inscriptions, but the latter are arranged differently on the obverse. *Zafar* beginning above the area and not on the left hand side as in No. 17. They are both of silver and copper. This Zafar Khán, son of Fīroz Sháh, died in Gujráat in 775, A. H. But he had a son also named Zafar Khan, and this coin may have been struck in his honour after the death of Fīroz Sháh.

No. 19 is a coin of Muhammad Shah, son of Fīroz Sháh. It is not in Thomas in this size. This coin is very light. In reading the margin of the large coin of this type, Thomas omits the word *Sultán* which is always on the best preserved specimens. The centre area is *Muhammad Shah*. The margin reads from the outside and is *Sultán, zarb bahazrat i Dehli*. The reverse of this coin is *Naib i Amír ul Mominín* 792.

No. 19a is a coin of similar type without any date on the reverse. Inasmuch as the margin of this coin reads from the inside, I am inclined to ascribe this to Muhammad bin Faríd Sháh, whose coins, when similar in type to the coins of the son of Fīroz, have always some difference in the arrangement of the words.

No. 20 is a coin of Muhammad Sháh son of Faríd Sháh. The inscriptions are, obverse *Sultán Muhammad Sháh, Faríd Sháh zarb Dehli*. Reverse *Khalifah Amír ul Mominín Khallad Khiláfotahu*. There is no date. There is some uncertainty as to the date of the death of this king. Thomas, quoting *Badaoni*, gives his death as 847. I got a coin of this king's during the time this plate was being prepared, dated 848. But this does not prove much; for from the time of Fīroz Sháh, the mints kept on coining in the names of kings who had been long dead; e. g., Mubárak Sháh died in 837. And I have coins bearing the date of 840 and 854. A whole series of posthumous coins of these kings might easily be made.

No. 21 is a coin of Bahlol Sháh. The inscriptions are, substituting *Bahlol Sháh* for Muhammad Sháh, similar to those on the last coin. Coins bearing these inscriptions are somewhat rare in the smaller size. This large-sized coin is to me unique, and it has not as yet been published. This is the third new type of Bohlol's that I have brought to light.

No. 22 has no business in this plate. It was put in to fill up a gap, and because I saw that the coin is new to numismatists, as it is not in the British Museum Catalogue or in Thomas' work on the Gazní coins. It is a binominal coin, struck evidently by Bahrám Sháh. Obverse:—*A'dl us Sultán ul Azim Bahrám Sháh*. Reverse:—*A'zd us Sultán ul Muazzim Sanjar*. Here Bahrám seems to arrogate to himself the title of *A'zim* "the greatest" and to give his ally (A'zd) Sanjar who had helped him to retain

his throne only the title *Muazzim* "the great," or "great," simply. Grammatically there is an apparent slight, but conventionally the title of Sanjar is as honorable as that of Bahrám. There is a difference, we know, for Muizz ud dín Muhammad bin Sám during the lifetime of his elder brother Gyás ud dín Muhammad bin Sám always used in his coins *Muazzim* for himself, until his brother's death when he took the title *ul A'zim*. But as I have shown above, Shams ud dín used the title *Muazzim*, as did also *A'la ud dín Masaud*; for I have two unedited small coins of his. Some two months ago I came across a find of Gazni coins in the Umritsur bazaar. There were about 500 in all. They contained several new types of Masaud III, Malik Arslán and Bahrám Sháh. The present war should cause some thousands to be unearthed and we may expect novelties for some time to come.

I now proceed to examine the coins in Plate VI. The first one is a small *Kashmiri* coin with the date (8)74 on it. It is a coin of Haider Sháh and confirms my statement in my paper on the Kashmir Sultans, that this king was reigning at that time, although his accession is usually marked in 878.

Nos. 2 and 3 are very pretty little novelties, of Muhammad Sháh and Sikandar Sháh. They are of copper. Obverse:—names of kings. Reverse:—the title *Sháh*. They are much smaller than Gyás ud dín's coins with similar inscriptions. They were evidently a revival of the small coins of Shams ud dín and Nasir ud dín Mahmúd and Muizz ud dín.

Nos. 4 and 5 are two anonymous coins of Humáyún, bearing the date 946. No. 4 was struck at Agra.

No. 7 a rupee, full sized, of Humáyún's, struck after his return in 962. It resembles very closely, in its get up, the rupees of Muhammad Súr. As yet all the silver coins of Humáyún which have been described have been thin and light, after the fashion of the *tankahs* of Central Asia. The inscriptions are very distinct. Obverse Area:—*Muhammad Humáyún. Bádscháh Gázi* 962. Margin:—*Us Sultán ul Adil Abú ul Muzaffar, Zurb (Dehli?)*. Reverse Area:—*the Kalimah*. Margin:—names and titles of the four companions of Muhammad.

No. 8 is a rupee of Muhammad Sháh of Bengal. Obverse Area:—*Muhammad Shah Sultan Gázi, Khallad allah mulkahu wa Sultanahu*; margin:—*Shams ud Dunya wa ud dín abu ul Muzaffar, Zurb, Satgáon*. Reverse Area:—*the Kalimah*, with a star; margin:—the names of the four companions and their titles together with the date 962. There is a difference between the titles of Umr in the above two rupees. In Humáyún's it is *Al Fárúq*, in the Bengal one *al Khattáb*.

No. 9, a new type of Baber's silver coins. It is of the *tankah* kind, but of uniform thickness and well struck, unlike most of the coins of

Baber. Obverse :—*Zahír ud dín Muhammad Bábar, Bádasháh Gházi* (9)87. *Khallad allah mulkahu wa Sultánahu, zarb Agrah.* (The bars and knots are not peculiar to the Kashmir coinage. They are found on the anonymous coins of both Baber and Humáyún). Reverse Area :—*the Kalimah*; Margin :—names and titles of the four Companions.

Nos 10, 11, 12, are three varieties of a new type of Humáyún's anonymous coinage. \* They were all struck at *Champánír*. *Firishtah* spells this word چانپانیر. The coins all agree in giving it حسانیر. The inscriptions of these coins give a new feature—a title to a city. *Champánír* is entitled the noble city *Shahr i Mukarram*. It speaks well for Humáyún's nature that he could so style a city he had just conquered; for the date of the coins is that of the conquest of the city 942.\* These coins too introduce a second new feature in Humáyún's anonymous coinage. Instead of *Fí ut tárikh*, they have *ba tárikh*. Obverse :—*Zarb Shahr i Mukarram*. Reverse :—*Champánír ba tárikh* 942. No. 11 belongs to Dav. Ross, Esq.

No. 13 is another of the anonymous coins of either Baber or Humáyún. I give it for two reasons: (1) It has full inscriptions. (2) The bar running across the Jaunpur anonymous coins resolves itself into a word *Mutabarrak*, the title of the city—the *Blessed*. Obverse, *Ba Dár ul zarb Khitta i Jaunpúr Mutabarrak*. Reverse :—*Fí ut tárikh san* 937; ornaments at the top and bottom. Most of the coins of Jaunpúr have a star on the obverse of one kind or other. But all have the bar, with the first letter and last one missing. All I have, have *dar ul zarb* on them too, although this is omitted by Thomas. The bars on some of the other anonymous coins may by the discovery of fuller specimens turn out to be some words or other.

Nos. 14, 15, 16, 17 and 18 are small copper coins of the Súrí family, forming of themselves a little set, out of which only one, No. 17, has been noticed by Thomas. No. 15 is the first of the set. Obverse :—*Khalífah uz Zamán* 947. Reverse :—*Sher Sháh us Sultán*. This is a very small coin indeed for Sher Sháh.

No. 16 is also Sher Sháh's, but it is larger and heavier than 15 and has a different inscription. Obverse :—*Sultán Khalífah uz zamán*, Reverse :—*Sher Sháh ul A'dil Sultán*.

No. 17 is Islám Sháh's, noticed by Thomas, No. 364, p. 413. I have given it here to complete the set at one view. No. 18 is Muhammad Sháh's Súrí. Obverse :—*Sultán Muhammad A'dil Sháh*: Reverse :—*Khalífah uz zamán Abú (ul Muzaffar)*.

No. 14 is Sikandar Súrí's. Obverse :—*Khalífah uz zamán* 962. Reverse :—*Sikandar Sháh us Sultán* 962. Thomas does not notice any halves of the large copper coins of any of the five Súrí kings. Halves of Sher Sháh are common, those of Islám Sháh are rare, those of Muhammad Adil

Sháh are extremely rare, while I have only seen one of Ibrahim Sháh and not one of Sikandar Sháh's. General Cunningham had a large copper one of Sikandar Sháh. Mr. Delmerick published one of Ibrahim's. The large coins of the other three are common, the greater numbers of course being Sher Sháh's and Islám's. I have not as yet come across a small coin of Ibrahim's. This is one of the things I am looking for. The Sikandar Sháh, whose coin is given in this plate No. 2, I believe to be the one who reigned in 795 for 45 days. A comparison of this coin with No. 275, p. 311 of Thomas, of which I have a most perfect specimen, leads me to this conclusion. Now if a king who reigned only 45 days could in that short time get out no less than *five* kinds of coins, I think we have a right to look out for the same number of varieties in the coins of kings who reigned longer. Scientific and systematic search with duly chronicled results ought to lead to much fuller knowledge respecting the coins of the Pathán's and their successors, and indeed with respect to the whole of the coins of the Empire of India from the time of Alexander the Great and Chandra Gupta to the times of Her Most Gracious Majesty the Empress of India and Queen of England.

As old coins are found, they find their way into the bazaars, where, if there is no purchaser at other than bullion rates, they are ruthlessly melted down, the silver being good, in order to supply metal to the makers of jewels. In this way undoubtedly thousands of coins disappear annually of which our museums and cabinets are standing in need. Meanwhile inasmuch as no Indian museum has its coins catalogued, no one knows what any collection may contain or may be in need of. Collectors would undoubtedly often present coins to museums which want them, if these wants were known. Students cannot use our Indian museums profitably until they know what the museums contain: and yet the end and object of all museums is an educational one. Hence I cannot help bringing this matter forward as one of the greatest importance in making our museums more useful in the promotion of historical studies.

Several other new varieties of coins including a rupee of Shams ud din Altamsh, a tankah of silver of the same king with *rays* round one side to represent *the sun* (Shams), a new variety of Rezia's and one of Kutub ud din Mubárah Sháh's together with several others must stand over to a future paper, in which I hope to be able to show that No. 158, p. 190 of Thomas was struck in *Talang* (Telingana), just the same as No. 11 of Plate IV of the Society's Journal of last year.

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*Memorandum on Coins of the Sunga Dynasty.*—By H. RIVETT-CARNAC, ESQ., C. S., C. I. E., F. S. A.

(With three Plates.)

I have to offer a few remarks on some more coins of the Sunga Dynasty submitted for the inspection of the Society.

Plate VII, No. 1 is a coin of quite a different type from those already sent. Mr. Carlleyle reads the inscription on it as *Ramadata*.

No. 2, A and B are 2 small coins with the legend *Achya* or *Bhanya*. (Mr. Carlleyle.) On the other side is what looks like the Buddhist wheel.

No. 3. The legend on this coin of *Bhanu Mitra* corresponds with that on the large coins already submitted to the Society and described by Mr. Carlleyle. The shape of the coin is, however, different, and a figure which Mr. Carlleyle takes for the Nirvána has been stamped in above the legend. There may, however, perhaps be some doubt whether this is intended for a recumbent figure of Buddha. It looks indeed more like a standing female figure on a low platform, a figure somewhat resembling that on the coin of Phaguni Mitra to be noticed later.

No. 4 is a similar coin. The legend not being in quite such good preservation.

No. 5 is a coin of *Agi* or *Agni Mitra* of the same type. In this specimen, however, the figure would seem to be that of a female, the bosoms being distinctly shewn. It is not unlike the rough representation on the Kanauj series of coins, see Plate XXIV, Vol. I, Prinsep.

No. 6, A, B, C are 3 small coins of the same type. The figures are distinct enough, but the inscription in each case is undecipherable.\*

I have already sent to the Society, in illustration of Mr. Carlleyle's paper, specimens of each of the various coins of the Sunga Dynasty. The specimens sent were specially selected on account of the legend and the marks stamped on the obverse. The design on the reverse is hardly of so much importance, but it may be interesting to notice the Monogram or device chosen by each king. From a large number of specimens I have selected those now sent to illustrate as far as possible these points. Unfortunately none of the specimens are in very good preservation. The coins when found looked most hopeless. (See No. 7 specimen in its original condition now sent.) But by a careful process of boiling and cleaning the legends and stamps on the reverse have been rendered sufficiently clear.

\* [They are probably coins of *Súrya Mitra*. On No. 6 B, the letters *s*, *y*, *m*, and on No. 6 A, the letter *s* can be distinguished. Ed.]

It is a curious fact that in hardly any case has it been possible to preserve the design on the reverse. Under the process of cleaning, what I may call the back of the coin has almost invariably flaked away. And this will hardly be wondered at when the condition in which the coins were originally found is seen.

The devices of the different monarchs may be noticed as follows:

*Bhumi Mitra.* The coins of this king, besides being very numerous, are nearly all in fairly good preservation. The device on the reverse is distinct. A standing figure on a platform, between two poles or pillars of victory, or whatever they may be called, each staff surmounted by three cross-bars, and the head surrounded by rays or flames. In the specimen No. 8 the figure holds what looks like a snake in its hand. The snake or line is not so distinct in all the coins (see Nos. 9, 10).

*Agi or Agni Mitra.* The coins numbered Nos. 11, 12 in Plate VIII bear nearly the same device as those of *Bhumi Mitra*. And of this king also it is to be noticed, that the coins, besides being numerous, are, comparatively speaking, in excellent preservation. Here also is a figure with rays or flames issuing from the head. This figure also stands on a platform between poles or staffs of victory. But in this case each staff is surmounted by what looks like a thistle or a *ghara*, whereas in *Bhumi Mitra's* coins at the summit of each staff are, as already noticed, three cross-bars. The smaller of *Agni Mitra*, Nos. 13, 14, 15, exhibit a different device. The standing figure has in its hand what would seem to be a snake. There are no square platform and no side poles. At the base are rays or flames.\* In fact the device is nearly the same as that on the coins of *Phaguni Mitra* now to be noticed.

*Phaguni Mitra*, Nos. 16, 17, 18, 19. These coins also are numerous and fairly well preserved. The device shews a standing female figure surrounded by what look like rays or flames.\* In the right hand is a club (?), lower down and also on the right side a device or monogram is clearly distinguishable.

The coins of *Bhadrachosa*, *Surya Mitra* and *Bhanu Mitra*, which, together with *Phaguni Mitra*, are, I understand, not only new coins, but also record the names of kings hitherto unknown, are much less numerous than those first noticed and are not generally in such a good state of preservation as those of *Bhumi*, *Agni* and *Phaguni*. Those of *Bhadrachosa* indeed are in most cases scarcely legible. And had it not been for the beautiful little specimen which came into my hands before the find in Bareilly, there might have been some difficulty at first in establishing the legend on these

\* [The base rather resembles the lotus-seat on the reverse of some Gupta coins. Ed.]

coins. Not one single specimen shows, with any distinctness, the design on the reverse. Two of the best in this respect that I have, are marked Nos. 20, 21. On these a female figure, resembling that on the coins of *Phaguni Mitra* can just be made out.

*Bhanu Mitra.* The device on Nos. 22, 23 is tolerably clear. The sun with pointed rays surmounts a semicircle which may be intended to represent a serpent. Below is what may be taken for a squat figure supporting the sun (P) but the device is perhaps hardly sufficiently distinct to admit of any very satisfactory conclusion being drawn. This may possibly be aided by coins of other types in the possession of the Society or figured in books which are not at my disposal.

*Surya Mitra*, Nos. 24, 25. Here, as the name denotes, is the sun surmounting what would seem to be a triangular-shaped altar with the staff of victory on either side. Here also the staff has the cross-bars as in *Bhumi Mitra's* coins.

To these I have added a coin of *Indra Mitra*, No. 26, similar to those already sent. This coin has I believe been found before. The device on the reverse is somewhat different from those already noticed, and shows a standing figure on a square platform, like that on the coins of *Bhumi* and *Agni Mitra*. In the right hand of the figure is a sceptre? The Staff of Victory noticed in the other coins is wanting here.

It will be seen that of the seven kings whose coins are noticed above, six of them adopted a different device. As regards the coins of *Bhadrachosa*, it is not possible to speak with certainty. It will be noticed too that these six *Mitras* have all included the sun, or the rays of the sun on their coins, suggesting possibly their *Mitra* or *Mithraic* origin. The symbols on the obverse of the coins have been described by Mr. Carlleyle, and in all cases the design is the same or nearly the same. There is little or no difference in the shape of the letters used. The legend is surmounted by three symbols which are in all cases the same, although in the coins of *Bhadrachosa* and *Bhanu Mitra* the central symbol appears to have been punched in separately. All this would seem to suggest that these seven kings belong to the same dynasty. Mr. Carlleyle has attributed them to the Sunga kings, who, according to Prinsep and other authorities, commenced to reign over Magadha about 172 B. C.

I shall be glad if the Society can afford me any information regarding these kings—the succession in which they reigned and the probable dates of the coins.

In Prinsep's list *Agni Mitra* appears next after *Pushpa Mitra* the first of the line. And this arrangement coincides with that given by Wilford and others in the Asiatic Researches. If the condition of the coin and the quantity in which it is found are of any significance, then *Agni*

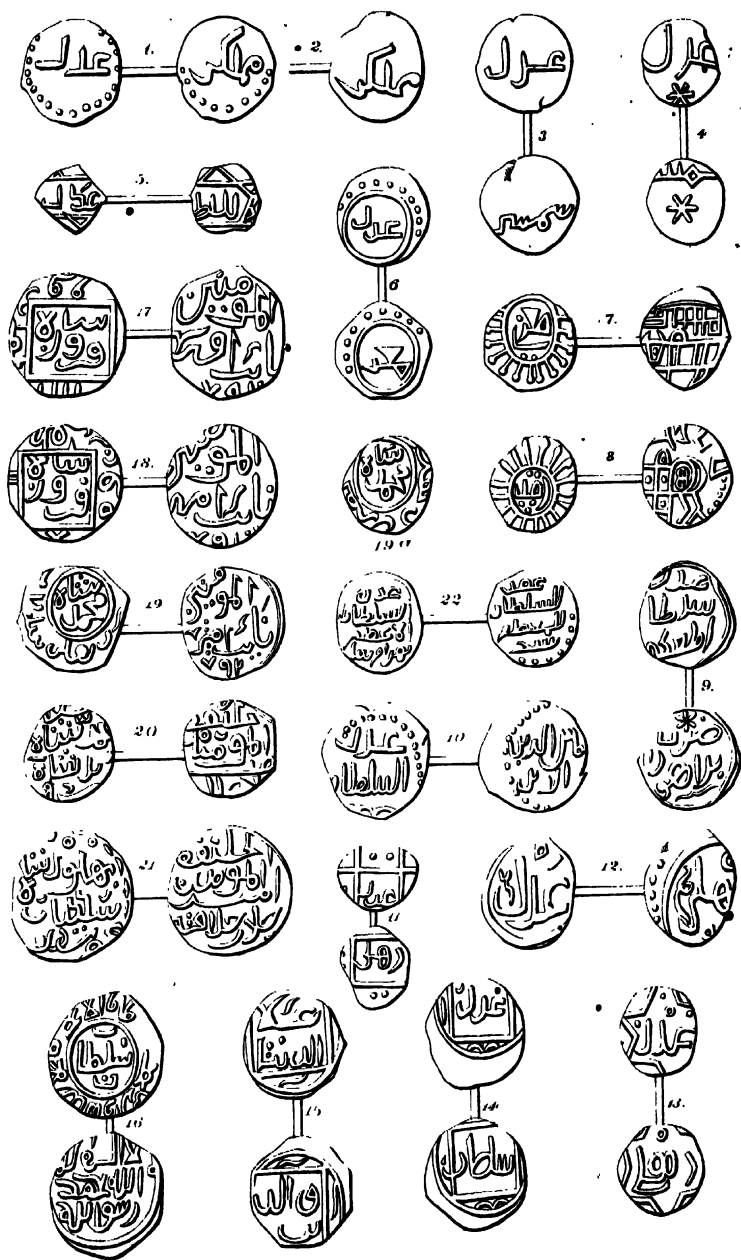
*Mitra* might fairly be supposed to be one of the most recent of these kings.

I have no suggestions to offer regarding any of them, save *Bhadraghosa*. It will be seen from Prinsep's list and also from Wilford's Essay in Asiatic Researches, Vol. XI, that one *Ghosa Vasu* preceded *Vajra Mitra*. Regarding this *Vajra Mitra*, Wilford in his Essay on Vikramaditya and Salivahana (see Asiatic Researches, Vol. IX, page 145,) writes as follows: "The first Vicramáditya is mentioned in the Cumáricá-c'handa; in which it is declared that after 3020 years of the Cali-yuga had elapsed, then would Vicramárca appear. He reigned fourteen years, and of course died in the year 3034, when the era of Yudhishtir ended and his own began. In the list of the kings, who were to appear in the Cali-yuga, to be found in the Bhágavata, Brahmánda, Váyu and Vishnu Puránas, there are two kings, the seventeenth and eighteenth in regular succession from Chandragupta, who reigned seven years each. The first is called *Vicrama*, and the other *Mitra*; and they are supposed to have been originally meant for *Vicrama mitra* who, according to some, reigned fourteen years; and in these lists, the father, or predecessor of Vicrama, is called *Ghosha Rája* or the king of thickets, which is another name for Gandharupa, or Gadhá-rája in the west. This looks like an interpolation; and the more so, as it will appear hereafter, that Ghosha-Rája died in the year 440 of our Era."

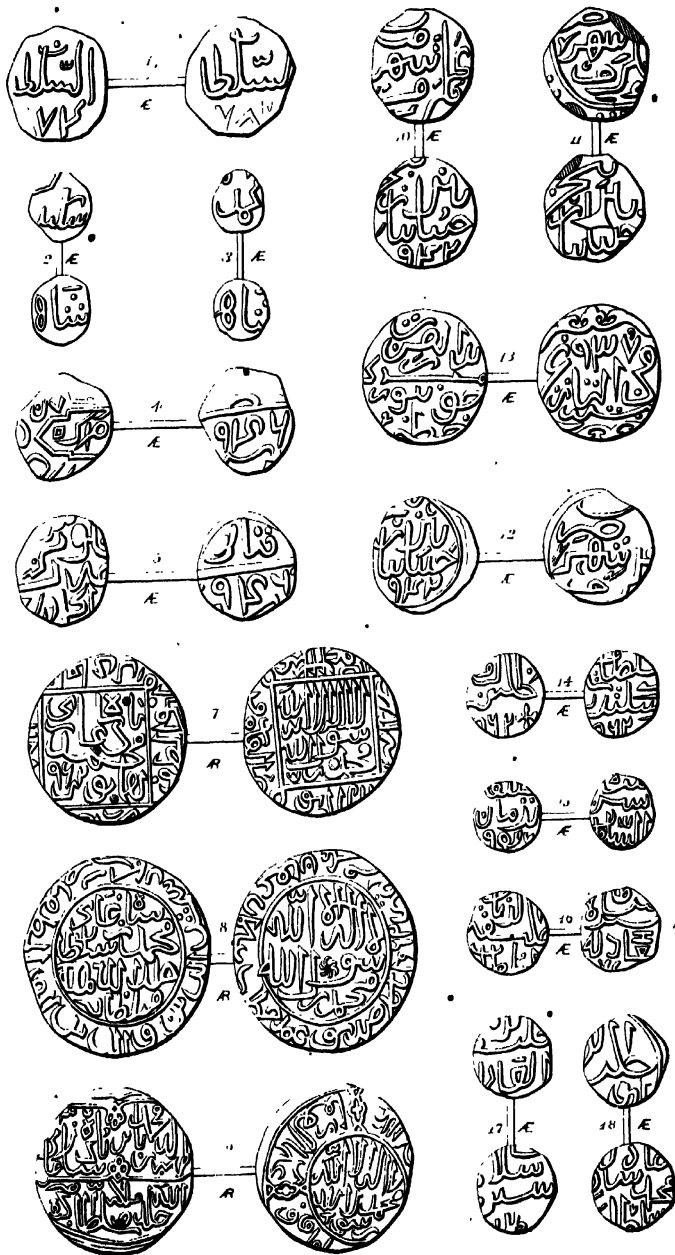
The *Vajra Mitra* of Prinsep's list is here supposed to be *Vikrama Mitra* or *Vikramáditya*, whose father and predecessor is *Ghosa Rája*. Wilford thinks that this name *Ghosa* looks like an interpolation. But perhaps the discovery of a coin belonging to this period, bearing the name of *Ghosa*, may help to establish the correctness of the entry?

It is perhaps also worthy of notice that Prinsep's list of the Kanwa Dynasty gives the name *Bhumi Mitra*, a contemporary of *Vikramáditya*. The coins of *Bhumi Mitra* and *Bhadraghosa* are certainly of about the same period, and possibly of the same dynasty. I am aware that since Wilford and Prinsep wrote, Mr. Thomas, General Cunningham and others have done much to clear up the doubts existing in respect to early Hindú Chronology. I am in hopes that those who are better informed than myself on the subject may be able to draw some practical conclusion from the coins which I have been able to collect.

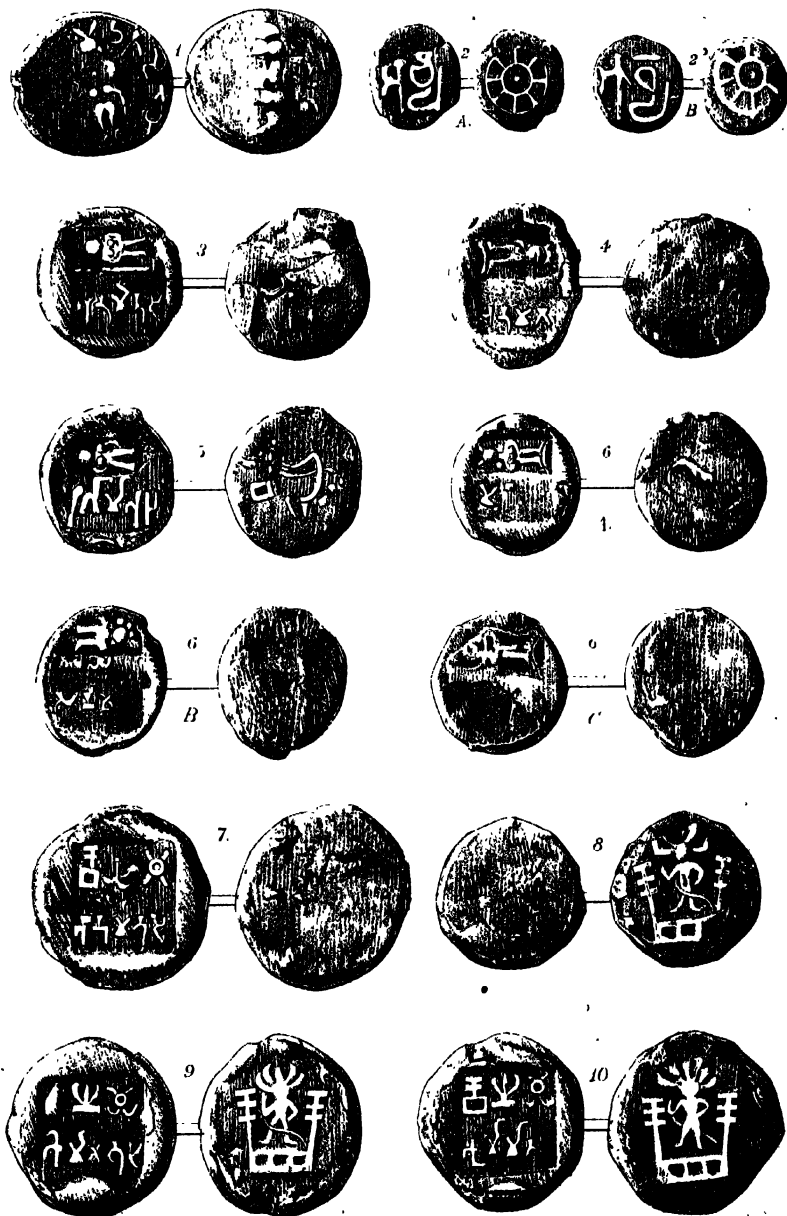
I may add that the mass of them have now been tolerably well cleaned. They have been carefully examined and read by Mr. Carlleyle and myself, but no new types save those sent to the Society have been found. They are entirely at the disposal of the Society if they wish to see them, and I hope that a complete set may be accepted for the Society's Museum. The only reservation I have to make is, that a complete selection of the best specimens should be reserved for the British Museum, which Institution ought, I think, to have the first choice.



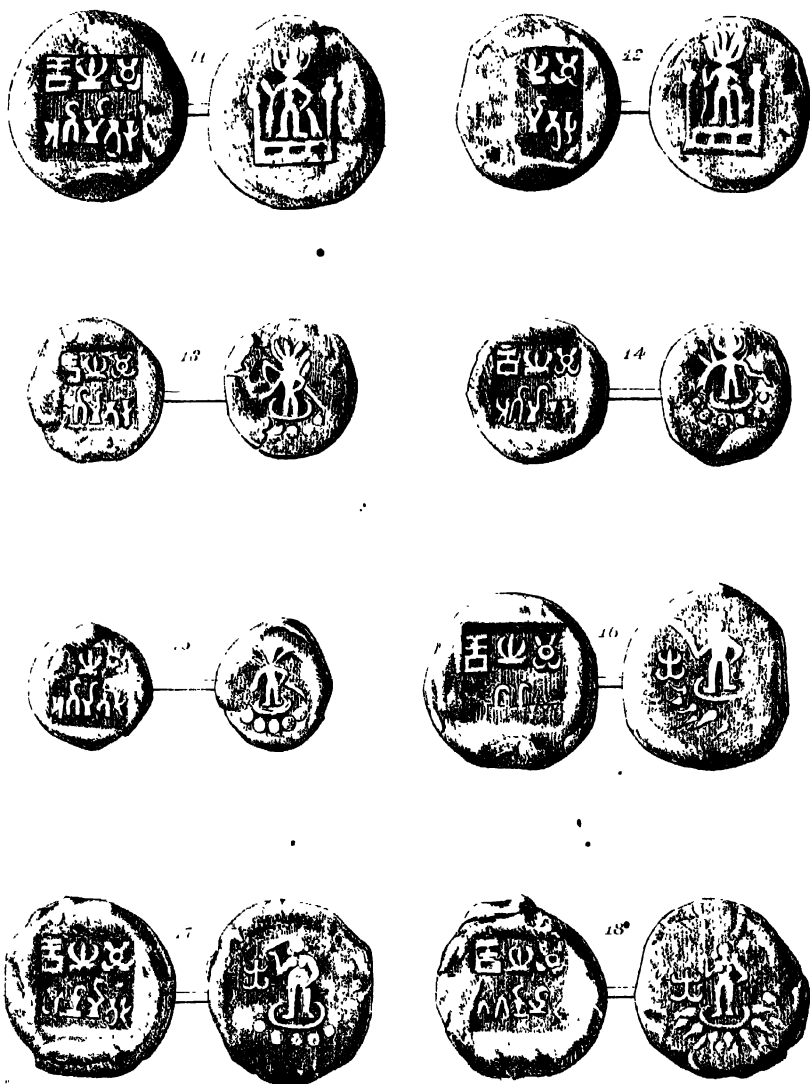




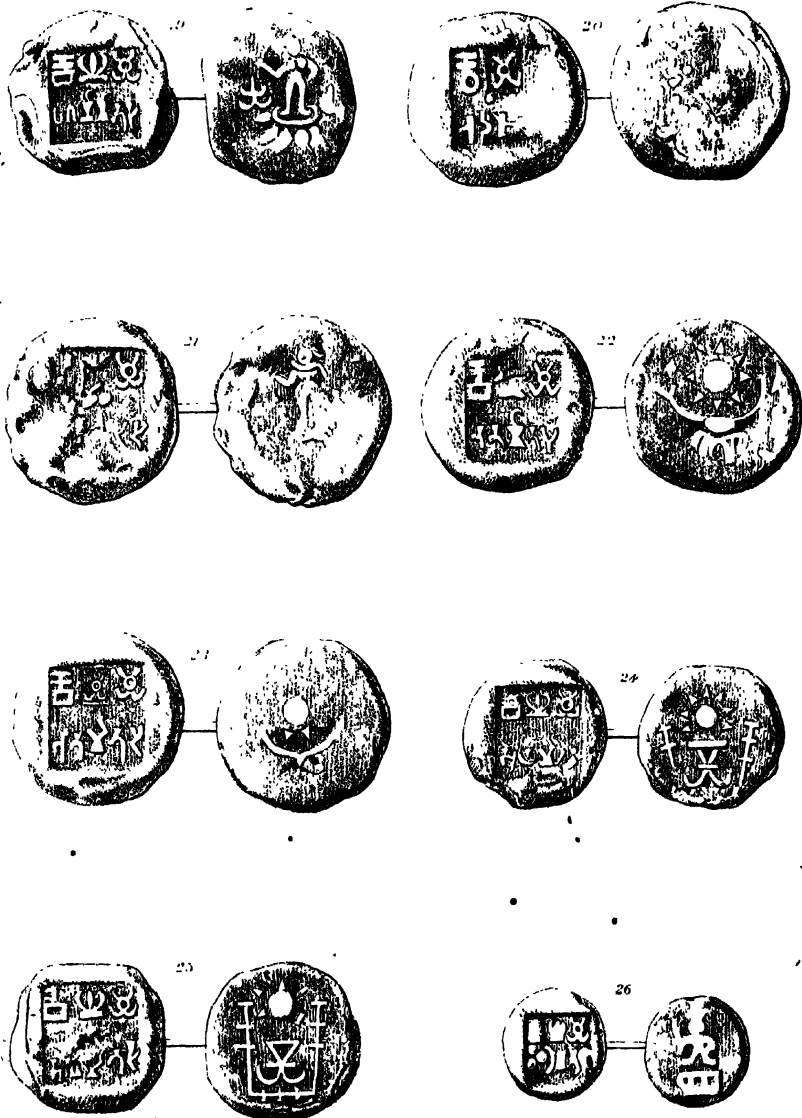
















the excuse to be found in all my papers on this subject that my notes were from the nature of the circumstances under which they were made necessarily of a rough and hurried kind and contain doubtless many mistakes, but as it seems the route is to be abandoned, it is likely to be a long while before it is again traversed throughout, and I hope therefore my notes will be found to be of value.

The geography of the route, thanks to the exertions and reports of the officers of the Survey of India\* who accompanied the Force, is now well known and needs no remark here. Suffice it to say that the Force was sent from the Pishin valley towards Dera Gházi Khán viâ the Kákar country and BA'RKHO'M to open up what is known as the Tal Chotiali Route, and that the present writer was attached to the 2nd or principal column of the Force. The route taken and referred to herein is shewn in detail in the map attached, which was published for me by the Surveyor General of India, and in its general aspect in the map attached to my paper on the Geology of the Route in a former number of this Journal.†

## II. *The Tribes en route.*

Before proceeding to discuss what was seen of the various tribes of Afgháns along this march, it may be as well to give a brief account of what is known of the vexed question of the origin of the Pathán and Afghán Tribes.

The people of the nation known in India as the Pathán Tribes call themselves BANI' ISRA'ÍL or PUKHTU'N (pl. PUKHTA'NA), and the Afgháns, as a race of these Pathán Tribes, claim descent from TA'LU'T‡ or SA'RU'L (the Saul of the Bible) as their ancestor. According to native accounts SA'RU'L had two posthumous sons BARAKÍ'A (BARACHIAH) and IRAMÍ'A§ (JEREMIAH), both born in the same hour of different mothers of the tribe of LA'WI' (LEVI). They rose to high positions under David, Saul's successor; thus Barakía became prime minister and Iramía Commander-in-Chief. In SULIMA'N's (Solomon's) time they were succeeded in their posts each by his son, Barakía by ASAF and Iramía by AFGHA'NA, and Afghána is said to have had the building of the BAITU-L-MUQADDAS or Temple of Jerusalem. Asaf left 18 and Afghána 40 sons, and these founded important families or tribes. When the BAITU-L-MUQADDAS was destroyed by BAKHTU-N-NASEB (Nebuchadnezzar) the Afghána Tribe, adhering to their forefathers' religion, were banished from SHA'M (Palestine) and took refuge in KOHISTA'N-I-GHOR and KOH-I-FIROZA. Here their neighbours called them Afghán (or Aoghán)

\* J. A. S. B., for 1879, paper by Major Waterhouse.

† J. A. S. B., for 1879, Vol. XLVIII, Part II.

‡ Raverty. *Gram. of Pushto*. Introd. 1860.

§ BIRKIYA and ARMIAN according to Raverty.

or Baní Isráíl. From GHOR by degrees the Afgháns extended to the KOHISTA'N-I-KA'BUL, KANDAHÁ'B and GHAZNI.

Until the advent of Muhammad the Afgháns followed the religion of the Pentateuch or TAURET KHWA'N. But in the 9th year of the announcement of Muhammad's mission they heard of him from one of the Baní Isráíl by name KHA'LID-BIN-(OR IBN)-WALI'D. A deputation was sent to Medina under one KAIS (also KISH, KESH or KAISH) a leading Afghán, who became a zealous Muhammadan and received several special marks of the Prophet's favour, among which the title of malik or king, originally conferred by the Almighty on Saul, their great ancestor, was conferred individually on the Afgháns.\* Arabic names also were given them; thus KAIS was called ABDU-R-RASHÍ'D (Servant of the Wise). And to him was also given the title of PIHTA'N (PAṬHA'N) meaning in Syriac a rudder, signifying that he, Kais, was the pilot of his people. From this Kais are descended all the Afghán Tribes properly so called, and all Afgháns are Patháns, the name by which the nation is most generally known in India. But there are many tribes who are Baní Isráíl and Pukhtún (Pukhtána) who are not Afgháns.

The Pukhtún, erroneously known in India as the Pathán Tribes, then are divided into those descended from Kais and those who are not. Those who are so descended are generally known as Afgháns and the others as merely Patháns, though the whole nation is also known as Patháns.†

The following is a list of the principal tribes of the present day generally acknowledged to be Afgháns :

- |              |                |                |
|--------------|----------------|----------------|
| 1. Duránis.  | 8. Túris.      | 15. Mangals.   |
| 2. Taríns.   | 9. Zaimukhts.  | 16. Jadráns.   |
| 3. Kákars.   | 10. Orákzais.  | 17. Shinwáris. |
| 4. Ghilzais. | 11. Dáwaris.   | 18. Mómands.   |
| 5. Povindas. | 12. Khóstwáls. | 19. Yúsufzais. |
| 6. Wazíris.  | 13. Afrídis.   | (Kóhistanís.)  |
| 7. Shíránis. | 14. Tájís.     |                |

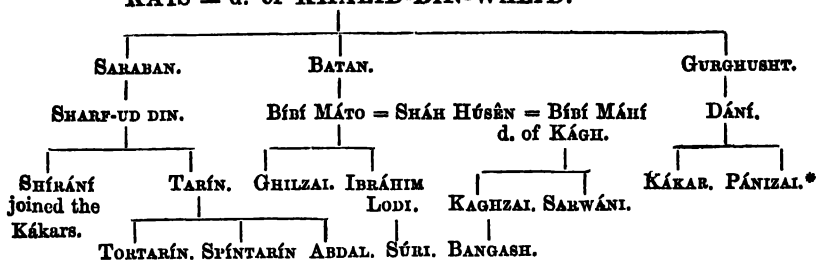
Kais married a daughter of KHA'LID-BIN-WALI'D by whom he had three sons, SARABAN, BATAN and GURGHUSHT and from them descend some of the principal tribes above mentioned; as may be seen by the accompanying genealogy.

\* At the present day the head of a Pathán family or tribal subsection is called malik.

† There are several legends to account for the names of Afghán and Pathán, that above given in the text is the commonest. The following are, however, worth noticing.

The word Pukhtún (Pukhtána) is said variously to be of Ibra'ni or Ibra'himi (Hebrew) and of Su'riani (Syrian) origin, and to signify "delivered" or "set free."

## KAIS = d. of KHALID-BIN-WALID.



The above genealogy which must of course be taken for what it may be worth, includes a good many of the ancestors of the present Afghán Tribes, but not by any means all. Each, however, has its own genealogical legend. It will be observed that the Duránis, the chief or largest tribe are not included in the above genealogy.

The Pathán Tribes we have to deal with in this paper are the Duránis slightly, and with the Taríns, Kákars, Lúnis and Zarkháns more fully. Of

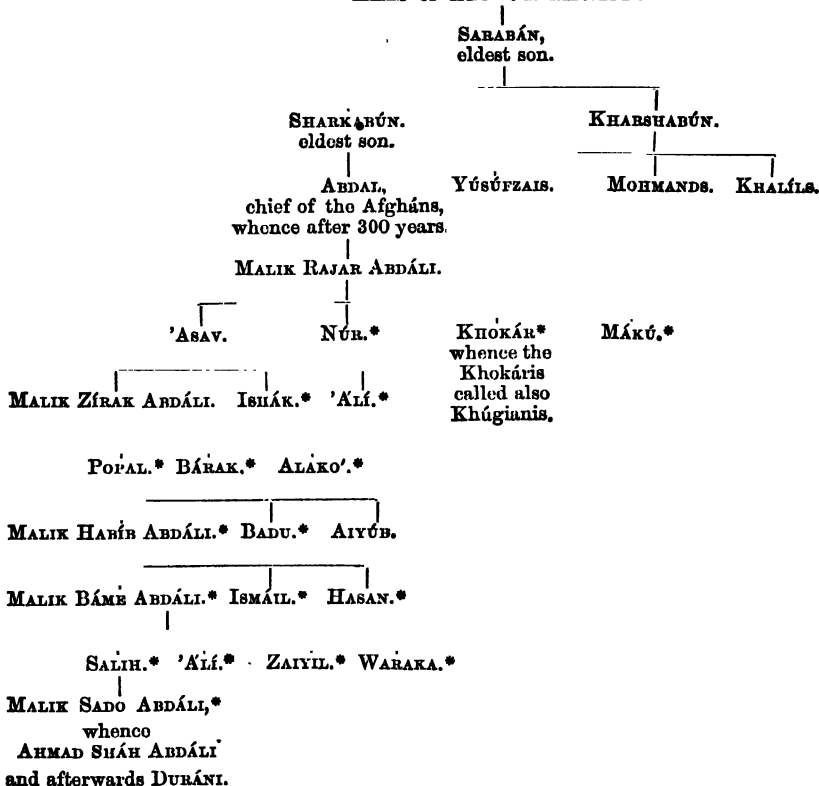
The common tradition about Afghán is, that the mother of their ancestor Afghána gave him the name because of her exclamation on the favourable answer to her prayers in the pangs of childbirth for a quick delivery, for she said on the birth of the child, "Afghána (I am free)," this being the traditional interpretation of the expression. Another tradition is, that she called out in her pangs "AFGHÁN" or "FIGHÁN" an expression of pain in the Persian language. According to the Kákar legends "Pathán" is a corruption of PRET KHÁN, the title given to the KAIS above mentioned by the Prophet. Raverty in the Introduction to his Grammar of Pushto gives an extract from the TAKKIRÁT-UL-MULÚK or History of the SADDÓZÁIS according to which the words PUSHTO (or PUKHTO) and PUSHTÚN (or PUKHTÚN) are derived from PUSHT or PASHT the name of the place Afghána first fixed on as his residence on leaving Palestine. In the same work a characteristically oriental derivation of the word Afghána is thus given. "The original meaning of Afghánah is fighán, a Persian word which means complaint, lamentation, because he (KAIS) was a cause of lamentation to the devil, the jinns and mankind. From the constant use of the word the vowel point *Kasrah* was dropped after which the other letters could not be sounded without the aid of a vowel and *alif-i-wasl* was placed before the *gh* and thus made Afghánah." And the term Pathán is further derived from batán or patán which in Arabic (بطان) signifies the keel (Raverty says keelson) of a vessel, "without which it cannot sail, neither can the ship of war sail along without the keel of battle."

\* The true Afghán descent of the posterity of the 2nd son BATAN is more than doubtful. It appears that BÍBÍ MÁTO (or MÁTU) the daughter of Batan formed an illicit connection with Sháh Husein, (or HÚSSÊN, called also MAST'ALI) a Persian Prince of Ghór and was made to marry him. The offspring resulting was named Ghalzai that is "the child of theft." She, however, also bore him a son Ibráhim Lódi from whom the former Pathán rulers of Delhi sprung. This Sháh Husein was also by a fraud induced to marry BÍBÍ MÁHÍ (or MÍHÍ) daughter of the KÁGH or bard who managed his marriage with BÍBÍ MÁTO, and from her are descended the present Kaghzai, Bangash and Sarwáni Patháns.

these the Duránis, Taríns and Kákars are Afgháns proper and so probably are the Lúnis, but the Zarkháns are merely known as Patháns.

First then regarding the Duránis, the chief of the Afghán clans. The origin of this tribe is apparently unknown, but it seems to be generally believed that it emigrated from the mountains of Ghór. According to the TAZKIRA'T-UL-MULU'K above quoted, the Duráni descent is as follows :

## KAIS or ABD-UR-RASHÍD.



The old name of the Duránis was Abdáli, till Ahmad Sháh, an Abdáli of the Sadozai family or subsection of the Pópalzai section of Abdális, the hero of Pánipat, in 1747 took the title of DURR-I-DURRA'N, the Pearl of Pearls, and named his tribe after himself Duránis. The two great divisions of the Duránis are ZÍRAK and PANJPA'O, and of these the most honorable by descent are the ZÍRAKS. The ZÍRAKS are usually divided into 4 sections (1)

\* Those marked with an asterisk with the addition of Zai are the names of present Duráni sections or subsections.

POPALZAI, (2) ALAKO'ZAI, (8) BA'RAKZAI, (4) ACHAKZAI and the PANJ-PA'OS into 5 sections, thus, (5) NU'RZAI, (6) ALI'ZAI, (7) ISHA'KZAI, (8) KHU'GIA'NI, (9) MA'KU'\*. Along our present route, however, only the Achakzais were found in any numbers, but a few of the Pópalzais and Báarakzais were also found in the Pishin. As far as I know there is but one Pópalzai village and one Báarakzai village in Pishin, but there are a good many Báarakzais scattered about the valley formerly concerned with the late government there. The Pópalzais of the valley are of the SADOZAI subsection †

The BA'RAKZAIS met with in the Pishin are all MUHAMMADZAIS, ‡ connected in some way with the late government of the valley. Sirdár KHU'SHDIL KHA'N of the royal house seems to have been Governor of the

\* There is also a low class of Duránis called SÁGZAI found in the ARGHISÁN valley.

† The Sadozais were the old ruling family of the Pópalzais and under ASAD-UL-LAH (of the Tribe ANDÁLI, sec. Pópalzai, subsec. Sadozai) threw off the yoke of the Persian at Herát in 1716, soon after MÍR VAIS, the Ghilzai, began to assert the independence of the Afghán nation. On the assassination of NÁDIR SHÁH in 1747, AHMAD KHÁN, a Sadozai (afterwards Ahmad Sháh Duráni) gradually conquered for himself all Afghánistán and most of the Panjáb, and at his death in 1773 he was ruling from the Sutlaj to the Oxus and from the Himalayas to Khorásán. Till 1793 TAIMU'R SHA'H his son reigned, but at his death his kingdom was fought for among his children in the way so common in oriental history, mainly resulting in the loss of the Panjáb to the Sikhs. The brothers who were ruling at the time of TAIMU'R SHA'H's death were

ZAMA'N SHA'H in Kábul.

HAMA'UN SHA'H in Kandahár.

MAHMUD SHA'H in Herát.

ABBA'S MÍRZA' in Pesháwar.

KO'HANDIL MÍRZA' in Kashmír.

Of these ZAMA'N SHÁH and MAHMÚD SHÁH obtained the throne of Afghánistán with the usual bloodshed, and after them another brother, the famous SHÁH SHÚJAH-UL-MULK, about 1809. Mahmúd Sháh, however, ousted him and again ruled till 1818, when he was deposed by the BA'RAKZAI brothers, sons of PAIND KHÁN, his Wazír, and son of HÁJÍ JAMÁL KHÁN (a MUHAMMADZAI BÁRAKZAI), the Sirdár who had helped Ahmad Sháh in the early days of his sovereignty. Since that date the Mohammadzai Báarakzais have fought among themselves for the throne resulting in the victory and sovereignty successively of the Amirs Dost Mohammad Khán, Shér Ali Khán and YaSúb Khán the late ruler. In 1839 the first Afghán war, the history of which is of course still fresh in our memories, was undertaken to restore Sháh Shújah-ul-mulk, the Sadozai, to his throne at Kábul. The Sadozais are still highly respected, and the Pópalzais from which they sprung are the most honoured among Afghán Tribes. During the greater part of the Sadozai ascendancy, the ministers were chosen from the BAME'ZAI subsection of the Pópalzais. The chief other subsections of the Pópalzais as far as I could ascertain are (8) MARINGZAIS, (4) KHA'NZAIS, (6) AITÚBZAIS, (6) MADOZAIS, (7) NO'AZAIS.

‡ The other subsection of the Báarakzais as far as I could ascertain were (2)

\* ACHALZAIS, (3) SULIMÁN'ZAIS, (4) KHUNSEI'ZAIS, (5) BAIANZAIS.

Pishin under Shér 'Alí, but never to have lived there, and I was quite surprised to find how little appeared to be known about him locally. His fort, called Khúshdil Khán, is in the north-east corner of the Pishin, and from it his Naib or Lieutenant NU'R MUHAMMAD KHA'N (Muhammadzai Bárákzai) seems to have ruled and collected the revenues. This last fled at our advance into the Pishin in 1878, and the valley was handed over for government under Sir E. Sandeman, agent for Beluchistán, with the fort Khúshdil Khán, to another NU'R MUHAMMAD KHA'N, LUGA'ER, a Belóch in our service as Názim or ruler.\* This Khúshdil Khán's descent was given me locally, thus :

HAJI JAMAL KHÁN (temp. Ahmad Sháh Duráni.)

SIRDA'R PAIND KHA'N (Muhammadzai Bárákzai)

MIHARDIL KHA'N.

↓  
KHU'SHDIL KHA'N.  
Governor of  
Pishin, 1878.

PU'R'DIL KHA'N.

↓  
MI'R AFZU'L KHA'N.  
Governor of Kan-  
dahar, 1878.

DOST MUHAMMAD KHA'N,  
Amir of Kábul.

↓  
SHER 'ALÍ' KHA'N,  
Amir of Kábul.

↓  
YAKU'B KHA'N,  
Amir of Kábul.†

\* Another and perhaps the most true local story is that Khúshdil Khán died about 7 years ago, say 1872, and in former days ABD-UL-KARÍM KHÁN (Muhammadzai, Bárákzai) was his Naib, but on Shér 'Alí's final accession in 1869, Khúshdil Khán lost his government and went to reside in Kandahár, while NU'R MUHAMMAD KHA'N (Muhammadzai Bárákzai) was sent to govern the Pishin direct from Shér 'Alí himself.

† Páind Khán's sons by 5 mothers were—

1. { FATEH KHA'N Wazir of Mahmúd Sháh,  
MUHAMMAD ÁZIM KHA'N,  
TAIMU'R KHA'N.
2. { PU'R'DIL KHA'N, Governor of Kandahár,  
SHERDIL KHA'N, Governor of Kandahár,  
KOHANDIL KHA'N, Governor of Kandahár,  
RAHM'DIL KHA'N,  
MIHARDIL KHA'N.
3. { DO'ST MUHAMMAD KHA'N, Amir of Kábul,  
AMIR MUHAMMAD KHÁN,  
JAMÁL KHÁN.
4. { SULTÁN MUHAMMAD KHÁN,  
YÁR MUHAMMAD KHÁN,  
PÍR MUHAMMAD KHÁN,  
SAYAD MUHAMMAD KHÁN.
5. { NAWÁB ÁSAD KHÁN,  
NAWÁB SAMÁ'T KHÁN,  
NAWÁB JANAB KHÁN.

The ACHAKZAI section of the Duránis is the tribe inhabiting the mountains known as the KHOJA AMRA'N Range, the TOBA Plateau, and the PISHIN and KADANET valleys in part. They are said to have been divided off from the Bárazkais by Ahmad Sháh, as that tribe was getting too powerful, and I have met Paṭháns about Kandahár, who classed the Achakzai as a Bárazkai subdivision. The Achakzais are divided into BAHÁ'DURZAIS and GAJANZAIS.

#### BAHÁ'DURZAIS.

GHABEZAIS.

SHAMUZAIS.

BA'KARZAIS.

KA'KOZAIS.

FA'MZAIS.

ISHDA'NIZAIS.

#### GAJANZAIS.

AHMADZAIS.

HAMZAIS.

ALOZAIS.

ASHEZAIS.

MALIKZAIS.

JULIZAIS.

BU'RHAZAIS.

LA'LIZAIS.

MUSHKIZAIS.

SHAMAKZAIS.

MA'PIZAIS.

BA'DAZAIS.

MA'LIZAIS.

HU'SENZAIS.

SHAKARZAIS.

KA'MILZAIS.

SULIMA'NZAIS.

USMA'NZAIS.

ADAZAIS.

ABDULLAZAIS.

ADRAKZAIS.

BA'ZAMZAIS.

I, however, came across two subsections of Achakzais not here mentioned called HABÍ'BZAIS\* and ABDALS in the Pishin. This name Abdal may perhaps only be the title of the malik or chief as the present Sirdár MÍR ASLAM KHÁ'N of the Achakzais is locally called Mír Aslam Khán Abdal or Abdáli, as also is MADAT KHÁ'N, the head of an Achakzai village in the Pishin, called after him. All the inhabitants of the last village, however, are called Abdals.

The next clan we have to deal with are the Taríns. These are the second of the Afghán Tribes in point of importance and national estimation. Their legendary descent from Kais is clearly made out. SARABAN, Kais's eldest son, had five sons of whom the second was Tarín. Tarín had three sons, Tór Tarín, Spín Tarín and Abdal, and from the two eldest are descended the modern Tarín Tribe. According to a legend Tarín's dark son was called Spín Tarín or Fair Tarín, and his fair son Tór Tarín or Dark Tarín. The Tór Taríns inhabit the Pishin valley and the Spín Taríns the country about Tal and Chotiáli. Lumsden subdivides this clan as follows:

\* Lumsden, however, makes out the HABÍ'BZAIS to be Tór Taríns, but as far as I could ascertain, they are Achakzais.

## TOR TARÍNS.

|             |                  |             |
|-------------|------------------|-------------|
| BATAZAIS.   | ALÍZAIS.         | HABÍBZAIS.  |
| HAIKALZAIS. | NÚRZAIS.         | HAMBÁNZAIS. |
| MÁLIZAIS.   | KULÁZAIS.        | KARBÉLAS.   |
| KADAZAIS.   | MÚSIZAIS.        | SÁZAIS.     |
| KHÁNIZAIS.  | ABDURRAHMÁNZAIS. |             |
| KHÁMZAIS.   |                  |             |

## SPÍN TARÍNS.

|            |           |          |
|------------|-----------|----------|
| SHÁDÍZAIS. | LASEÁNIS. | ADWÁNIS. |
| MARPÁNIS.  |           |          |

This list agrees with that given me *en route* as far as the Spín Taríns are] concerned, but as regards the Tór Taríns mine differs considerably. First I would remark that the HABÍBZAIS are, as far as I could make out, Achakzais and not Taríns at all. Next as regards the Karbélas, who have been hitherto put down as Taríns somehow connected with the Pishin Sayads, I have ascertained the following particulars. The Karbélas inhabit a village of the same name near SAYAD PAIND in the Pishin and call themselves Sayads. They are, however, disowned by the Sayads and also by the Taríns, Kákars and Duránis. The local legend regarding their origin is this. In days gone by, a little child by name Karbéla, was travelling through the Pishin in a káfila. He lost his party and was seen running along the road, crying, by a kind-hearted SAYAD who took him in and nourished him, but declined to admit him into his family or sect. On growing up, he married a Tarín woman, and from him there sprang by Tarín intermarriages the present race of Karbélas, now said to be 600 strong in men. This is the Sayad version of the story, the Tarín legend is the same except as regarding intermarriages with themselves. They say the mother of the original Karbélas came from no one knows where and disown the whole race. The probabilities are, they sprung from Patháns who had to take refuge in the Pishin from some other distant place. The KHÁNIZAIS are divided into LÚN KHÁNIZAIS and DAB KHÁNIZAIS according to my information. In the list of Tór Taríns which I collected, the following do not appear in Lumsden.\*

|           |           |              |
|-----------|-----------|--------------|
| MÁLÍKYÁRS | MANZAKAIS | * KAMÁLZAIS. |
| MÁEZAIS   | HÁRÚNS.   |              |

While his list contains the following which are not found in mine.

|          |                 |             |
|----------|-----------------|-------------|
| KÁDAZAIS | NÁOZAIS         | HAMBÁNZAIS. |
| KHÁMZAIS | ABDURRAHMÁNZAIS |             |

\* There are a few trifling variations in some names regarding which see below on Language.

The probabilities are that a combined list would reach nearest the true statement of their subsections.\*

Like the Taríns, after whom they rank, *i. e.*, third on the list of clans, the Kákars claim direct descent from KAIS. Firstly, Kais's third son was GURGHUSHT who had three sons DÁNÍ, BÁBÍ and MANDÍ. Of these DÁNÍ had four sons, KÁKAR, NÁGHAB, DÁDÍ and PÁNÍ.† Secondly SHÍRÁNÍ the eldest son of SHARÍF-UD-DÍN, eldest son of SARABAN Kais's eldest son, on account of family squabbles joined the Kákars, and called himself a GURGHUSHTAI. Such is the common legend. The Kákars themselves vary it thus. Kais went to Mecca and there obtained the name of PRET KHÁN (elsewhere PIHTÁN). His eldest son SHARÍF-UD-DIN or SARABÁN had five sons SHÍRÁNÍ, TARÍN, MYUNÍ, BARECHÍ‡ and UMAR-UD-DÍN. The mother of SHÍRÁNÍ, who was a Kákar, finding that her husband intended making TARÍN, his second son, his heir, left his protection and returned to her own tribe. Her descendants have therefore been included among Patháns and with them the whole of the Kákars under one name. This subverts the other legends which make the Kákars claim descent through GURGHUSHT from KAIS.

The following clans claim relationship with or descent from the Kákars. The GÁKARS of Kashmir along the Jhilam, the TAIMUNIS (EIMAKS) of GHOR, the FIROZKHÍ HAZÁBAS (EIMAKS) of HERÁT, the KAYANIS of SEISTÁN,§ and lastly the KÁKARS and GHILZAIS also consider themselves nearly related in blood. Taking into consideration the unquestionably mixed blood of the Ghilzais and their legendary relationship with the Kákars, as also that of such pure EIMAKS as the HAZÁBAS and TAIMUNÍS,|| the Kákar descent from Kais would seem to be doubtful.

\* Among the tribes of Tarín descent are said to be the ZAIMUKHTS.

† This would make the PA'NÍ'ZAIS separate from the Kákars, but they seem to be considered a section of them at the present day.

‡ Whence the BARE'CHÍ' Patháns of SHORA'WAK.

§ Usually called Belóchis, but really descendants of SANDAR KHE'L Kákars.

|| A pure EIMAK is perhaps, however, a misnomer. The origin of the race being quite obscure. By features they are TA'TARS and by language Persians. They are divided into TAIMU'NÍ's, HAZA'RAS, TAIMU'RÍ's and ZU'RÍ's. It may help towards the solution of the Eimak origin to quote the following from Yule's Marco Polo, I, 94. "Contemporaneously with the KARAUNAHS (or KARA'WINAHS the celebrated robbers of mediæval Persia) we have frequent mention of predatory bands known as NIGU'DARIS who seem to be distinguished from the KARAUNAHS, but had a like character for truculence. Their head-quarters were about SJISTÁ'N, and Quatremère seems disposed to look upon them as a tribe indigenous in that quarter. Hammer says they were originally the troops of Prince NIGU'DAR, grandson of CHAGATAI (CHAGATAI was the ruler and curse of Turkistán and a son of CHINGIZ and therefore brother to OKKODAI and uncle to MANEKU, KUBLAI and HULA'KU), and that they were a rabble of sorts, Mongols, Turk-máns, Kurds, Shúls and what not. We hear of their revolts and disorders down to

The Kákar Territory extends from the Pishin valley to the Borai valley and from the Zhób valley to Quetta, the line of the Bolán Pass and the MARBI (Belóch) country. They are divided into two main divisions, the Great Kákars (LOWE' KÁKAR) and the Lesser Kákars (KUCHNAI KÁKAR). As regards the Great Kákars, the present writer had but little opportunity of learning much. They occupy the Zhób valley and apparently are divided into—

|               |            |             |
|---------------|------------|-------------|
| KHWAIDÁDZAIS, | AKTABZAIS, | MEHTARZAIS, |
| MURSIÁNGZAIS, | AWAZAIS,   | SARGABZAIS. |

And probably also the JALAGZIS, MU'SA KHEL and KARÍZAIS belong to this division.

The Lesser Kákars are divided into SULIMÁN KHEL; AMAND KHEL; MEHTARZAIS; PÁNÍZAIS; BÁZAIS; SHAMOZAIS; SURGARZAIS; MALAGZIS; ISÁ KHEL; SARA'NGZAIS, of which MULÁZAIS and TÁRÁNS are subsections; ZAKHPELS, subdivided into AMAKAIS, KANOZAIS and NÁOZAIS; DUMARS; UTMÁN KHEL; and SANDAR KHEL, whose known subdivisions are ÁLFZAIS, SHABOZAIS, MU'RS, DARGAIS, WAHÁRS and TENIZAIS.\* The Kákars about KHUNCHAGAI near Mt. KAND, variously called the SANATFA and SIMANTHA Kákars, are I believe the AMAND KHEL above mentioned. They were formerly, under the name of TARGHÁNÍS, under HÁJÍ KHÁN of infamous memory during the war of 1839, and his son KÁMIL KHÁN is now chief of the AMAND KHEL.

The next clan met with *en route* was the LU'NI (properly LONAT) KHEL, about whom very little is known. They are generally supposed to be Kákars by descent, but I should say from what I heard from the LU'NIS themselves and from the Kákars, this is not the case. They call themselves of DURÁNI descent, a claim which is allowed by their neighbours. The HAMZAZAIS are the only known subdivision of this Tribe, but there are

1319, up to which date MIRKHOND says that there had been 21 fights with them in 4 years. Again we hear of them in 1336 about Herát, whilst in Báber's time they turn up as NUKDARIS fairly established as tribes in the mountainous tracts of KAENU'D and GHOR to the west of Kábul, and coupled with the Hazáras who still survive both in name and character. Among them, says Báber, are some who speak the Mongol languages. The Hazáras are eminently Mongol in feature to this day, and it is very probably that they or some part of them are descendants of the KARAUHAHS or NIQU'DARIS or of both, and that the origination of the bands so called from the scum of the Mongol inundation is thus in a degree confirmed. It is worthy of notice that Ab-ul-Fazl who mentions the NUKDARIS among the nomad tribes of Kábul says, the Hazáras are the remains of the Chagataian army which MANGKU KHA'N sent to the aid of HULA'KU under the command of NIQU'DAR OGHZA'N.

\* The Esóts of the DARRAJAT are sometimes called Kákars but this is doubtful. KA'BI' KÁKARS are said to inhabit the SHA'L Valley (Quetta), but I did not see any there.

doubtless more, and I think it would be safe to include **SABÁGIS** amongst them. They inhabit a largish extent of country, for the most part considerably deserted, and used merely as grazing-ground. Their villages are mostly found in what is called the **LU'NI** Valley to the south of the **BÓrai**, i. e., between it and the Tal Valley. All the country from the **BÓrai** Valley east of the Tal Valley as far as the **Belóch** Border and the **Mu'sa KHEL** country belongs to them, except the small portion occupied by the **ZARKHA'NS** near **Chótiáli**.

Of the **ZARKHA'NS** nothing more is known except that they are **Patháns** and not of **Kákar**, **Tarín** or **Lúni** extraction. They are to be found about the mountains to the east and south of **Chótiáli**, in the **HANOKAI** Pass and **BA'LA' DHA'KA'**. The **MARRIS** have nearly wiped them out as a race by continual raids. In **Leech's** time\* there were three villages belonging to them near **Chótiáli**, viz., **DOST MUHAMMAD**, **FAZL KHAN** and **ALÍ KHAN**, but I do not know if they still exist.

Perhaps the origin of the **Lúnis** and **Zarkháns** and even of some of the **Kákars**, especially the **Sandar Khél**, should be sought with that of the neighbouring **Belóch** Tribes, if one could only ascertain what that is. Indeed the **KAYANIS** of **SEISTAN** usually called **Belóchis**, are **Sandar Khél Kákars**, and there is nothing repugnant in the history of the **Belóch** Tribes to the idea of some of them being of the same descent as their deadly enemies the **Patháns**. For the **KAIHÍRIS** about **CHATTAR** and **PULEJI** in **KACHH**, now acknowledged to belong to the **Belóch** Tribes, are of unquestioned **Pathán** descent.† And, although the presence of many **Belóchi** words in their dialects may be the result of propinquity, the similarity of face and figure of the **LU'NIS**, **SANDAR KHELS** and **ZARKHA'NS** to the neighbouring **Belóch** Tribes of **BA'RKHO'M** is quite remarkable, and they might well have a common origin with them, especially as the **Belóchis** can hardly be called a nation, being rather an agglomerate of heterogeneous tribes. Thus the **BRANHO'IS** are probably aboriginal, the **GURCHA'NIS** a **Sindian** Tribe, the **RINDS** and **LU'MRIS** probably of **Hindú** (**Rájpút**) origin and the **GA'DURS** of **LAS** of **Arab** descent, while the tribes of **MAKRA'N** are **Arabs**, **Sikhs**, **Sindhís**, **Persians**, **Jats** and what not.‡

\* Major **Leech's** journeys were made about 1839.

† **Hughes's** **Beluchistán**.

‡ In connection with the probable **Turkman** or **Mongol** origin of the bulk of the **Belóch** Tribes, the words **TUMAN** and **TUMANDA'R** are interesting. **TUMAN** or **TOMAN** was a **Mongol** division of the army, viz., 10,000, and hence in the **Mongol** dominions it came to mean 10,000 generally. **WASSAF** describing **KINSAY** (**KINGSSE'** or **HANGCHAU**) states it had "70 **TOMANS** of soldiers and 70 **TOMANS** of **RAYATS**." **Marco Polo** states its revenue in **TOMANS** of gold and **Friar Odoric** in **TOMANS** of **BALISH** (paper money). **TMAN** or **TMA** is still used in **Russia** for 10,000. In **Beluchistán** **TUMAN** means a camp and **TUMANDA'R** the commander of a camp and thence the chief of a tribe, but whether

While discussing the Pathán Tribes something should be remarked about the SAYADS found in every part of Afghánistán\* and in some numbers in the Pishin where they own several villages. Wherever they may happen to be, they are a sect apart from the surrounding inhabitants, are always respected and seem to be more intelligent than the Patháns in general. They are not considered Patháns and claim to be of Arab descent as their name implies. This claim, however, is I think of a slender description among the Sayads in the Pishin with whom we have now to do. Their sympathies are all Afghán, they are subdivided in a suspiciously similar manner, and the story of their descent confirms the suspicions as to their separate origin from the Patháns about them. The story is that HA'RU'N, fifth in descent from Kais, had a daughter who married an Arab Sayad who visited him, and from her are said to be descended all the Pishin Sayads, notably the SHA'DIZAIS and HAIDARZAIS.† The present subdivision of the Pishin Sayads appear to be—

|             |              |              |
|-------------|--------------|--------------|
| GANGALZAIS. | SHA'DIZAIS.  | YA'SINGZAIS. |
| BAGARZAIS.  | BRAHAMZAIS.  | URUMZAIS.    |
| AJABZAIS.   | HAIDARZAIS.‡ |              |

The following table shows the subdivisions of the tribes above discussed as far as known.

| No. | Tribe.                 | No | Division. | No | Section.   | Subdivision. | No. | Subsection. |
|-----|------------------------|----|-----------|----|------------|--------------|-----|-------------|
| I.  | DURA'NI or<br>ABDA'LI. | 1  | ZÍRAK.    | 1  | P'OPALZAI. |              | 1   | SADOZAI.    |
|     |                        |    |           |    |            |              | 2   | BA'ME'ZAI.  |
|     |                        |    |           |    |            |              | 3   | MARSINGZAI. |
|     |                        |    |           |    |            |              | 4   | KHA'NZAI.   |
|     |                        |    |           |    |            |              | 5   | AIYU'BZAI.  |
|     |                        |    |           |    |            |              | 6   | MADOZAI.    |
|     |                        |    |           |    |            |              | 7   | NOAZAI.     |
|     |                        |    |           | 2  | ALAKO'ZAI. |              | 1   | JALUZAI.    |
|     |                        |    |           |    |            |              | 2   | MELAZAI.    |
|     |                        |    |           |    |            |              | 3   | SARKA'NI.   |
|     |                        |    |           |    |            |              | 4   | SANDARZAI.  |
|     |                        |    |           |    |            |              | 5   | KA'REZAI.   |
|     |                        |    |           |    |            |              | 6   | NAUSAZAI.   |

this is due to the passage of the Mongols through their country on towards Hindustán or to their Central Asian origin does not appear. Yule's Marco Pole, I, 94, 281 and II, 169, 171.—Hughes's Beluchistán.

\* I saw one village of them in BA'RKHO'M among the Independent Belo'ch Tribes.

† According to one legend, the KARB'ELAS are descended from a waif picked up by this HA'RU'N. See above.

‡ Among the Pishin Sayads faces of a Si'dr' type are not uncommon, and I saw one woman with purely African features near A'LI'ZAI. This may result, however, from their wandering habits and be no indication of descent.

[illegible]

| No. Tribe.                | No. Division. | No. Section.  | Subdivision.                                                                                                       | No. Subsection.                                                                                                                                                                                                                                                        |
|---------------------------|---------------|---------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I. DURA'NI or<br>ABDA'LI. | 2 PANJPA'O.   | 8 KHU'GIA'NI. | <div>SIRKI<br/>WAZI'RI.</div> <div>MOTIK<br/>WAZI'RI.</div> <div>KHAIBU'N.<br/>KHAIBU'N.</div> <div>SHERZAH.</div> | <div>{ 1 RA'NI KHEL.</div> <div>{ 2 NANI.</div> <div>{ 3 AGA'M.</div> <div>{ 4 PI'RA KHEL.</div> <div>{ 5 AHMAD.</div> <div>{ 6 KHOZEH.</div> <div>{ 7 NAJI'BI.</div> <div>{ 8 KHARAI.</div> <div>{ 9 PANJPAI.</div> <div>{ 10 DOPAI.</div> <div>11 KHIDAR KHEL.</div> |

9 MA'KU.  
10 SA'GZAI.

|             |               |                          |                   |
|-------------|---------------|--------------------------|-------------------|
| II. TARI'N. | 1 TOR TARI'N. | 1 BATAZAI or<br>BADOZAI. |                   |
|             |               | 2 KHA'NIZAI.             | 1 LU'E KHA'NIZAI. |
|             |               | 3 A'LI'ZAI.              | 2 DAB KHA'NIZAI.  |
|             |               | 4 NU'RZAI.               |                   |
|             |               | 5 KULA'ZAI.              |                   |
|             |               | 6 MU'SIZAI.              |                   |
|             |               | 7 SEGAI.                 |                   |
|             |               | 8 MA'LIKYA'R.            |                   |
|             |               | 9 MAEZAI.                |                   |
|             |               | 10 HA'IKALZAI.           |                   |
|             |               | 11 MANZAKAI.             |                   |
|             |               | 12 MA'LIKAI.             |                   |
|             |               | 13 HA'BU'N.              |                   |
|             |               | 14 KAMA'LZAI.            |                   |
|             |               | 15 KADAZAI.              |                   |
|             |               | 16 KHA'MEZAI.            |                   |
|             |               | 17 NAOZAI.               |                   |
|             |               | 18 ABDURRAH-<br>MA'NZAI. |                   |
|             |               | 19 HAMRA'NZAI            |                   |

|             |                 |               |
|-------------|-----------------|---------------|
| II. TARI'N. | 2 SPI'N TARI'N. | 20 SHA'DIZAI. |
|             |                 | 21 MARPA'NI.  |
|             |                 | 22 LASRA'NI.  |
|             |                 | 23 ADWA'NI.   |

No. Tribe.      No. Division.      No. Section.      Subdivision.      No. Subsection.

## III. KA'KAR.

1 LOWE' KA'KAR 1 KHWAIDA'D-

ZAI.

2 MURSIA'NGZAI.

3 AKTARZAI.

4 AWAZAI.

5 MEHTARZAI.

6 SURGARAI.

7 JALAGAI.

8 MU'SA KHEL

9 KABI'ZAI.

10 BA'RAKZAI.

2 KUCHINAI  
KA'KAR.11 SULIMA'N  
KHEL.

1 TRAGARAI.

12 AMAND

KHEL OF SIMAN-

THA OF SANATI'A.

13 MEHTARZAI.

14 PA'NIZAI.

1 ADIZAI.

15 BA'ZAI.

16 SHAMOZAI.

17 SURGARAI.

18 MALAGAI.

19 I'SA' KHEL.

20 SARA'NGZAI.

1 MULA'ZAI.

2 TA'RA'N.

21 ZAKHPE'L.

1 AMAKAI.

2 KANOZAI.

3 NAOZAI.

22 DUMAR.

23 UTMA'N

KHEL.

24 SANDAR

KHEL.

1 A'LI'ZAI.

2 SHABOZAI.

3 MUR.

4 DARGAI.

5 WAHA'R.

6 TENIZAI.

7 KAYANI.

IV. LU'NI KHEL. 1 HAMZAZAI.

2 SARA'GI.

V. ZARKHA'N.

*Tribes of doubtful Afghān descent.*

|              |   |             |
|--------------|---|-------------|
| I. SAYAD.    | 1 | GANGALZAI.  |
|              | 2 | BAGARZAI.   |
|              | 3 | AJABZAI.    |
|              | 4 | SHA'DIZAI.  |
|              | 5 | BEAHAMZAI.  |
|              | 6 | HATDARZAI.  |
|              | 7 | YA'SINGZAI. |
| II. KARBELA. | 8 | URUMZAI.    |

(To be continued).

*On the Śūryaprajñapti.*—By DR. G. THIBAUT, *Principal, Benares College.*

## PART I.

Until recent times our knowledge of the cosmological and astronomical system of the Jainas was very limited and founded not on an independent investigation of the original Jaina literature, but only on the occasional references made to Jaina doctrines by the orthodox Hindu writers on astronomy. For a long time the short account of the subject given by Colebrooke in his "Observations on the sect of the Jainas" (*Asiatic Researches*, 1807; *Essays*, Vol. II), remained the only one, and although accurate as far as it goes, it is very insufficient since it chiefly refers to the one doctrine of the Jainas only, which has at all times struck outsiders as peculiarly strange and absurd, *viz.*, the assertion that there exist two suns, two moons and a double set of constellations. This is indeed the doctrine by which the system of the Jainas could most easily be distinguished from similar old Indian systems, and it is consequently referred to and controverted with preference in the *Siddhāntas*. The best known passage from the latter is the one quoted by Colebrooke from Bhāskara's *Siddhānta-Siromani*. "The naked sectaries and the rest affirm that two suns, two moons and two sets of stars appear alternately; against them I allege this reasoning. How absurd is the notion which you have formed of duplicate suns, moons and stars, when you see the revolution of the polar fish."

This passage of Bhāskara's is manifestly founded on a passage found in Brahmagupta's *Sphuṭa-Siddhānta* where we read in the so-called *Dúshā-nádhya*:

मानि सप्तः पञ्चासत् सौ द्वावर्तौ द्यौः जिनेश्वरं च ।  
 भुवनत्रयावर्ता भवन्ति यतोऽस्मात् तत्तत्सदृशम् ॥

“There are fifty-four nakshatras, two risings of the sun ; this which has been taught by Jina is untrue, since the revolution of the polar fish takes place within one day.”

And a passage to the same effect occurs in the 13th adhyāya of Varāha Mihira's Pañchasiddhāntikā.

In 1868 Professor A. Weber, to whom we are indebted for our first acquaintance with so many works of Indian literature, published in the tenth volume of the “Indische Studien” a paper on the Sūryaprajñapti, being apparently the most important astronomical book whose authority the Jainas acknowledge, and it then appeared that the doctrine of the existence of two suns, moons, etc. constitutes only one feature of a comprehensive system which on the whole is much less fantastical than might have been expected and which, fantastical or not, shows intimate relations to the astronomical and cosmological views which appear to have prevailed all over India before Greek science began to influence the East. Especially it appeared—as pointed out by Professor Weber—that the doctrine propounded in the Sūryaprajñapti shows in many points an unmistakable resemblance with that contained in the Jyotisha-Vedāṅga the presumably oldest specimen of Indian astronomical literature, and it thus became manifest that the astronomical books of the Jainas do not only furnish information about the opinions held by a limited religious sect, but may, if rightly interrogated, yield valuable material for the general history of Indian ideas. The writer of the present paper has therefore thought it worth while to submit the Sūryaprajñapti to a renewed detailed investigation, whereby we should be enabled rightly to esteem its position in the astronomical literature of India, clearly to conceive the peculiar features distinguishing the astronomical system of the Jainas from other systems, and on the other hand to point out what the Jaina system has in common with other systems, and in what way therefore it may be employed for the elucidation of the latter. Professor Weber's paper gives in the main only a short summary of the contents of each chapter of the Sūryaprajñapti, following the order of the chapters as found in the work itself and omitting none of them. This was of course the right plan to adopt in a paper giving the first account of a hitherto unknown book. In the present paper it has on the other hand been preferred to give a connected account of the chief doctrines only which are found in the Sūryaprajñapti, to combine hints found in the various parts of the work wherever this appeared necessary for the sake of greater clearness, and again altogether to omit relatively unimportant matter. It must be stated at the outset that this paper—like that of Professor Weber—is based more on Malayagiri's commentary on the Sūryaprajñapti than on the text of the latter work itself ; which apparently anomalous proceeding finds its explanation in the fact of the Manuscripts

of the *Súryaprajñapti*, commonly met with, containing the commentary only *in extenso*, while as a rule only the first words of the passages commented on are given. As it, however, appears that the commentary faithfully follows the text, and as on the other hand the latter, devoid of a commentary, would be hardly intelligible, the absence of a complete text of the *Súryaprajñapti* is less inconvenient than might at first be assumed. At any rate we may obtain at present a sufficiently full and accurate knowledge of the contents of the book; and in works of the class to which it belongs the interest attaching to the form is a comparatively small one. As already stated, the present paper is by no means intended as an exhaustive review of the contents of the *Súryaprajñapti*; it is rather meant as an introduction to a complete edition of the work itself which, on account of the various old materials it contains, well deserves to be published *in extenso*. And an introduction of this kind could not well be missed, even if we possessed a complete edition or translation of the book, as the reader of the text of the work or of a literal translation of the text would find it by no means an easy task unaided to reconstrue the leading features of the system.

The *Súryaprajñapti* is written in Jaina-prākṛit, and divided into twenty books called *prābhṛitas*, some of these again into chapters, called *prābhṛita-prābhṛitas*. The arrangement of the matter treated of is by no means systematical, and the text, still more the commentary are full of tedious reiterations. Malayagiri, the commentator, has done his work most conscientiously; too conscientiously, the reader afflicted by his extraordinary diffuseness often feels tempted to say. Especially he delights in illustrating the numerical rules given in the text by at least half a dozen examples, where one would have sufficed, dwelling with evident complacency on each step even of the simplest calculation. But his comments are very porcupineous and certainly deserve to be extracted, although not to be reproduced *in extenso*.

Proceeding now to our proposed task, let us dispose at the outset of the distinctive doctrine of the Jainas according to which there are two different suns, two moons and two sets of constellations. When inquiring into the origin of this certainly peculiar notion, we are led to a very simple reason, an impartial consideration of which makes the Jaina system appear much less fantastical and arbitrary than we at first are inclined to think. This reason has already been pointed out by Colebrooke, Asiatic Researches, Vol. IX, p. 321, where he says "They (the Jainas) conceive the setting and rising of stars and planets to be caused by the Mountain Sumeru and suppose three times the period of a planet's appearance to be requisite for it to pass round Sumeru and return to the place where it emerges. Accordingly they allot two suns, as many moons, and an equal number of each planet, star and constellation to Jambudvīpa; and imagine that these appear on alter-

nate days south and north of Meru." These words scarcely require anything added to be to them in the way of comment. The Jainas hold (as will be seen in detail further on) the old Indian idea of sun, moon and stars revolving round Mount Meru. To anybody holding this opinion, the question must have suggested itself "In what time is one such complete revolution performed?" The prevailing opinion, represented for instance by the Purāṇas, was that the whole revolution is performed in twenty-four hours, so that the sun describes during the time when it is day in Bharata-varsha the southern half of his circle, and during the time when it is night to the south of Mount Meru, and day in the countries north of it, the northern half. The Jainas, however, took a different view of the matter. To them it seems to have appeared more appropriate that as there are four directions—south, west, north and east—the sun's circle should be divided into four quarters corresponding to the four directions, and that he should bring day in succession to the countries to the south, west, north and east of Meru. But then, as it must be supposed that his passing through each of the four quarters occupies the same time, how can it come about that he again appears to rise to the Bharatavarsha after the lapse of a period only sufficient to advance his place by one quarter of the circle? Out of this difficulty the Jainas extricated themselves by simply assuming that the sun rising on a certain morning is not the same sun which had set on the preceding evening, but a second sun similar in every way to the first one. The whole circle is thus described by two suns separated from each other by half the circumference, each of which appears in the Bharatavarsha on alternate days. The same reasoning lead to the assumption of two moons and two sets of stars.

Great as appears to be the difference produced by this hypothesis between the system of the Jainas and the commonly received opinions, it practically is of very small importance and may—as will be done in the following—as a rule be left altogether out of account whenever we have to consider the motions of sun and moon. When for instance the sun having started from Āśvinī has passed through the twenty-eight nakshatras, he enters, according to the generally received opinion, again into the same nakshatra Āśvinī, according to the Jaina opinion into a second nakshatra called Āśvinī too; but as this second nakshatra has the same name, the same extent, and the same relative position as its namesake, as like the latter it is preceded by Revatī and followed by Bharanī, and as at the same time when the sun has entered into the second Āśvinī, another sun the exact and indistinguishable counterpart of the former one has entered into the former Āśvinī, it is clear that we may, when speaking of the motion of the heavenly bodies, save ourselves the trouble of continually referring to two suns, two moons and two sets of nakshatras and, remembering

that there are two of each kind, express ourselves as if there were only one. To proceed.

The astronomic-chronological period on which the system of the Śūryaprajñapti is based, is the well-known quinquennial yuga, or cycle with which we have long been acquainted from the Jyotisha Vedāṅga. The same cycle is described in the Garga Samhitā as we see from the extant fragments of the latter work, and we learn from Varāha Mihira's Pañchasiddhāntikā that it likewise formed the fundamental doctrine of a Paitāmaha Siddhānta which, according to Varāha Mihira's judgment, was one of the more important Siddhāntas known at his time. It is alluded to and rejected in a few words by Brahmagupta in the dūshanādhyāya of the \*Sphuṭa Brahma-siddhānta. References to this cycle are met with in the early history of Buddhism. Whether the so-called Vedic literature is acquainted with a cycle of this nature is doubtful.\* It will not be necessary to dwell in this place at length on the constitution of the yuga; it will suffice to state that it is based on the assumption of five sidereal revolutions of the sun being exactly equal in duration to sixty-seven periodical revolutions of the moon and to sixty-two synodical months, while one complete revolution of the sun is supposed to be performed in three hundred and sixty-six days. That a cycle of this nature based as it is on an utterly wrong assumption could maintain itself for a considerable time as it manifestly has done is a matter for legitimate wonder, and does not find a parallel in the history of chronological systems among any other civilized nation. At the end of one yuga already the quantity of the error induced by the mistaken estimation of the length of the solar year amounts to nearly  $5 \times \frac{1}{2} = 3\frac{1}{2}$  days, the accumulation of which quantity after the lapse of a few yugas could not escape the attention, we should think, of even the most careless observers. The matter would indeed lie altogether differently if a conjecture (or as it stands we might almost say, an assertion) of Colebrooke referring to this point had been verified. He—after having given an account of the manner in which the Jyotisha-Vedāṅga manages to maintain harmony between civil and lunar time—continues "and thus the cycle of five years consists of 1860 lunar days or 1830 nycthemera, subject to a further correction, for the excess of nearly four days above the true sidereal year: but the exact quantity of this correction and the method of making it, according to this calendar, have not yet been sufficiently investigated to be here stated." The fact is that of this correction which Colebrooke considered so indispensable, that he speaks of it as being actually found in the Vedāṅga, no

\* The question referred to in the text cannot be discussed here. The writer hopes shortly to find an occasion fully to treat it elsewhere.

traces are to be found either in the Vedāṅga itself or—and this is of great importance as the Vedāṅga is still partially unexplained—in the Sūryaprajñapti which illustrates the constitution of the quinquennial yuga in the most diffuse manner, but has nothing to say about a correction of the kind mentioned.—The subdivisions of the yuga are in the Sūryaprajñapti described with great fulness; what is really essential admits, however, of being stated in a few words. Each solar year is divided into two *ayan*as of one hundred and eighty-three days each. Each *ayana* in its turn comprises six solar months, each of which lasts  $30\frac{1}{2}$  days. Two of these solar months constitute a solar season; the reckoning of the seasons starts, however, not from the beginning of the yuga, but the latter is made to mark the middle of a season, so that the rainy season which counts as the first begins a month before the beginning of the yuga. Again the yuga comprises five years of 360 days each, each year in its turn being divided into twelve months of 30 days each; in the Sūryaprajñapti this kind of year—commonly known as the *sāvāna* year—is called the *karma-year* or *ritu-year* which latter name would more properly be given to the solar year. The six days by which this year is shorter than the solar year are called *atirātras*. Again the yuga comprises sixty-two synodical months, the first of whom begins with the moon being full in the first point of Abhijit. Each of these months is divided into a light and a dark half; each half comprises fifteen *tithis* or lunar days of equal duration. Sixty-two of these months being equal in duration to sixty-one *karma*-months of 30 days each, it follows that sixty-two *tithis* are equal to sixty-one natural days; in order therefore to maintain harmony between the numbers of the natural days and those of the *tithis*, a break in the counting of the *tithis* is made whenever two *tithis* terminate during one natural day, *i e.*, according to the Sūryaprajñapti on the occurrence of each sixty-second *tithi*. The details of this process are not stated in the Sūryaprajñapti, but there can be no doubt that *mutatis mutandis* it was managed as it has been managed in India ever since. To give an example, the sixtieth natural day, counting from the beginning of the yuga, during which the sixtieth *tithi* terminated was counted as *pañcadaśī* (fifteenth *tithi*), the next following day as *pratipad* (first day of the new lunar half month) and then the day after that not as *dvitīyā*, second lunar day, but as *tritīyā* third lunar day, the second lunar day having already terminated together with the preceding sixty-first natural day. These sixty-two lunar months are divided among five lunar years, the first, second and fourth of which comprise twelve lunations each, while the third and fifth count thirteen each. The technical name of years of the latter kind is *abhivardhita-samvatsara*, the increased year. The method according to which the two thirteenth months are intercalated in the yuga is

not described in detail; it is however clear enough how it proceeded. The thirty-first lunation and again the sixty-second one were not counted, but formed together with the month immediately following a kind of double month taking its name from the second constituting member. Thus there is nominally no thirteenth month, and a proper name for the latter is therefore not required.

Again the yuga consists of sixty-seven periodical lunar months, the moon during it returning sixty-seven times to the place from which she had started at the beginning. No attempt is made in the *Sūryaprajñapti* to group these months into years nor are they subdivided into days of equal duration; they are simply said to comprise  $27 \frac{3}{4}$  days each. They are, however, subdivided into two ayanas each, analogously to the division of the solar year into ayanas. This division is indeed legitimate enough as it is based on the alternate progress of the moon towards the north and south, about which details will be given later on. Less comprehensible is on the other hand the division of each periodical month into six lunar seasons, whose names answer to those of the solar seasons beginning with the rainy season; a division of this kind is of course utterly gratuitous and purposeless, and to us interesting only as a specimen of the Indian's excessive tendency to systematize.

If we now proceed to an examination of the account given in the *Sūryaprajñapti* of the revolutions of sun and moon, we find at the outset that it differs from the statements made by Garga and in the *Vedānga* in one important point. According to the latter authorities (see *Jyotisha-Vedānga*, v. 6; this Journal for 1877, p. 415; Weber, *Nakshatras* II, pp. 28, 33), the yuga begins with the winter solstice, at the moment when it is new-moon, sun and moon being in conjunction in the beginning of the nakshatra *Dhanishṭhā*; according to the *Sūryaprajñapti* the yuga begins with the summer solstice, at the moment when the moon is full in the beginning of *Abhijit* and the sun consequently stands in *Pushya*. The coincidence of the winter solstice with new moon marking, according to the *Vedānga*, the beginning of the yuga may of course actually have taken place at the time when the doctrine of the quinquennial yuga was first established and will have recurred later on from time to time; but it is evident that it could not regularly recur every fifth year. To this fact, however, as well as to the change which in consequence of the precession of the equinoxes gradually took place in the position of the sun at the time of the winter solstice, the eyes of the Hindus seem to have remained shut during a considerable period. Now it is curious to see that in this one point at least the author of the *Sūryaprajñapti* who, on the whole, faithfully adheres to the old system and does not hesitate to take over the quinquennial yuga itself with all its glaring imperfections, considered himself entitled or

obliged to deviate from the received tradition. For once the testimony of the eyes was placed above old authorities. In the first place, the winter solstice had so far receded from the beginning of Dhanishṭhā that the change could not be ignored; in the second place, it must have so happened that at the time of the author of the *Sūryaprajñapti* no new moon took place together with the winter solstice, while—as we may presume—some full moon happened to coincide or nearly to coincide with some summer solstice. Accordingly the beginning of the yuga was changed. Faute de mieux the summer solstice coinciding with full moon was taken as the new starting-point, and the sun's place at the time was removed from the middle of Āśleśhā which it had occupied in the old system to a point in Pushya. The moon's place at the time of the summer solstice, being separated from the sun's place by half the circumference, is then at the beginning of Abhijit; the latter point marks at the same time the sun's place at the time of the winter solstice.

The account given in the *Sūryaprajñapti* of the position of the sun at the two solstices enables us to enter into a consideration of the approximate time at which either the work itself or some older work on which it may have been based was composed. The expression "approximate" is used on purpose as the general difficulties besetting an estimation of this kind referring to Indian astronomical works are well known, and as in our case special difficulties arise in addition to them. As will be seen later on, the *Sūryaprajñapti* throughout employs twenty-eight nakshatras of unequal extent, while the *Vedāṅga* as well as the bulk of the later astronomical literature make use of twenty-seven nakshatras of equal extent. The relation of these two systems to each other necessitates a short excursus, for the starting-point of which we take a passage in Bhāskara's *Siddhānta Siromaṇi* (Grahagaṇita, *Spashṭādhikāra*, 71-74, p. 93 of Bāpu Deva's edition) and a parallel passage from Brahmagupta's *Sphuṭa-siddhānta*. The former of the two, translated, runs as follows:

"This method of finding the Nakshatras which has thus been taught in a rough manner by the astronomers for the purposes of common life, I shall now teach in an accurate form as it has been proclaimed by the ṛishis for the purpose of processions, marriages, etc. The experts have declared six (nakshatras) to have one portion and a half, *viz.*, Viśākhā, Punarvasu and the (four) nakshatras called dhruva; six to have half a portion, *viz.*, the constellations presided over by the Sarpas, Rudra, Vāyu, Yama, Indra, Varuṇa; the remaining fifteen to have one portion each. The portion of one nakshatra is called the mean motion of the moon (during one ahorātra). The minutes of the circle lessened by the portions of all (the 27 mentioned) nakshatras are the portion of Abhijit, lying beyond the nakshatra of the Viśve Devas, etc." These statements are repeated in Bhāskara's own

commentary, the *Vāsana*, where the common names of the nakshatras (*Viśākṣā*, *Punarvasu*, *Rohiṇī*, the three *Uttaras*;—*Āśleśhā*, *Ārdrā*, *Svātī*, *Bharanī*, *Jyeshthā*, *Śatabhishaj*) are given and where *Pulīśa*, *Vasishṭha*, *Garga* and others are said to be the *Ṛishis* alluded to in the text. The rough mode of computation referred to in the beginning of the above quotation is the one contained in v. 67 of the same chapter and agrees with the rule given in the *Sūrya Siddhānta*, II, 64. According to it, when we wish to find the place of sun or moon or one of the planets in the circle of the nakshatras, we have to divide the longitude of the heavenly body expressed in minutes by 800; the quotient then shows the number of nakshatras through which the planet has already passed, and the remainder the traversed part of the nakshatra in which it is at the time. This rule therefore bases on the assumption of twenty-seven nakshatras each of which extends over one twenty-seventh part of the circle. Now, according to *Bhāskara*, the *Ṛishis* taught that whenever greater accuracy is required, the nakshatras have to be considered as being of unequal extent. In the first place only fifteen of them are to be regarded as having the average extent, while six exceed that amount by one half and six others remain below it by one half; and in the second place the twenty-seven nakshatras are no longer to occupy the whole circle, but only that part of it which corresponds to twenty-seven times the mean daily motion of the moon, while the remaining part of the circle is assigned to a twenty-eighth nakshatra *Abhijit*. *Bhāskara*'s statements are manifestly founded on a passage met with in the 14th chapter of the *Sphuṭa Brahmasiddhānta* which gives the same details regarding the different extent of the nakshatras, and is introduced by the following verse—

पौलिशरोमकवासिष्ठसौरपैतामहेषु यत्प्रोक्तम् ।

तद्ब्रह्मचानयनं नार्थभेदोक्तं तदुक्तिरतः ॥

“The calculation of the nakshatras, which has been taught in the *Paulīśa*, *Romaka*, *Vāsishṭha*, *Saura*, *Paitāmaha Siddhāntas*, is not mentioned by *Aryabhata*; I therefore proceed to explain it.”

And later on—

ब्रह्मर्षादिजेनाणि संहितान्त्रभिहितानि गौरौचैः ।

यस्माद् ब्रह्मणि तस्माद्ब्रह्मभेदोक्तं तदानयनम् ॥ .

The explicit statement about number and extent of the nakshatras in the older period of Indian astronomy, which is contained in the two passages quoted from *Brahmagupta* and *Bhāskara*, is of considerable interest. If the account given by these two writers is correct and there is no reason to doubt of that, it appears in the first place that the mere circumstance of only twenty-seven nakshatras being mentioned in some detached fragment of an astronomical work which we do not possess in its entirety,

would not justify the conclusion of the author of the work having been acquainted with twenty-seven nakshatras only. Nay, even the author of a treatise like the Vedāṅga who throughout speaks of 27 nakshatras only may have done this simply because he meant his work to be an elementary one, unencumbered by the assumption of 28 nakshatras of unequal extent. In the second place the distinct statement that the old writers on astronomy made use of Abhijit solely when greater accuracy was aimed at, and that they then made its extent to correspond to the excess of a sidereal month above twenty-seven days, certainly seems to point to the conclusion that the introduction of Abhijit into the circle of the nakshatras was an after-thought, consequent on the improved knowledge of the length of the moon's periodical revolution. With regard to the books in which, according to Bhāskara and Brahmagupta, the division of the sphere into 28 nakshatras of unequal extent was taught in addition to the simpler division into 27 equal nakshatras, we have to remark that the Sūrya-siddhānta known to us contains no such statement; the Saura-siddhānta of Brahmagupta may have been a different work. We are unable to control the statement with regard to the Romaka, Paulīśa, Vāsishṭha-Siddhāntas. Of Garga, however, we know from quotations several passages bearing on the point in question: in the first place, the passage quoted by Bhaṭṭotpala (in his commentary an Varāha Mihira's Bṛihatsaṃhitā, IV, 7; see Weber, Nakshatras, I, p. 309), which corroborates Bhāskara's statement regarding the different extent of the Nakshatras, is, however, silent about Abhijit. As the passage stands, it would lead us to infer that Garga divided the whole circle into twenty-seven parts, the extent of fifteen of which is equal to one, of six to one half and of six to one and a half. The quotation may, however, be incomplete, and at any rate we have Brahmagupta's and Bhāskara's word for Abhijit having been acknowledged by Garga too. However this may be, that Garga, as a rule, introduced into his calculations neither Abhijit nor the inequality of the extent of the twenty-seven nakshatras, appears from the places which he assigns to the sun at the two solstices, viz., at the beginning of Dhanishṭhā and the middle of Āśleshā; for if we calculate the place of the summer solstice by starting from the beginning of Dhanishṭhā and making use of the unequal extent of the nakshatras, we obtain as place of the summer solstice not the middle of Āśleshā but rather the end of it or the beginning of Maghā.

To return. The special difficulty by which we are met when attempting to compare the places assigned to the solstices in the Sūryaprajñapti with the places which they occupy according to Garga and the Vedāṅga on one hand and the Siddhāntas on the other hand, lies in the circumstance of our not knowing exactly how the two divisions of the sphere—the one into 27 nakshatras of equal extent, the other into 28 of unequal extent—were made

to correspond with each other. If we suppose—and this seems the most likely supposition—that each of the 27 nakshatras was curtailed by the twenty-seventh part of the small portion assigned to Abhijit and that the reckoning started from the beginning of Abhijit, (which according to the system of the *Sūryaprajñapti* is the first of the series, as at the beginning of the yuga it is in conjunction with the moon), we may hazard an hypothesis with regard to the time lying between the Vedānga and the *Sūryaprajñapti*, or rather between the observations of the solstices recorded in the two works. According to the Vedānga the winter solstice takes place in the beginning of Dhanishthā, according to the *Sūryaprajñapti* in the beginning of Abhijit (which is the place of the full moon on the day of the summer solstice at the beginning of the yuga, and consequently the place of the sun on the day of the winter solstice); the two places are therefore separated by the whole of Sravana and Abhijit. Having, according to the hypothesis stated above, reduced the extent of Sravana ( $= 13^{\circ}33$ ) by the 27th part of the extent of Abhijit, which extent is equal to about  $4^{\circ}12$ , we obtain for Sravana  $13^{\circ}18$ ; to this we add Abhijit  $= 4^{\circ}12$ ; the sum *viz.*,  $17^{\circ}3$  indicates the extent of the displacement of the solstice during the intervening period. Allowing seventy-two years for  $1^{\circ}$  of precession, the length of this period would be about 1246 years. If we therefore knew the absolute date of the Vedānga we might state the approximate absolute date of the observation recorded in the *Sūryaprajñapti*, on the supposition always of the manner in which the two divisions of the sphere have been adjusted to each other being the right one. But, as Professor Whitney has shown, it is scarcely possible to form any satisfactory conclusion with regard to the date of the Vedānga, and we therefore abstain from giving a positive opinion about the date of the *Sūryaprajñapti*.

We now proceed to a detailed consideration of the hypothesis by which the author of the *Sūryaprajñapti* tries to account for the appearances presented by the various motions of the heavenly bodies, beginning with the sun.

The three different motions of the sun which he endeavours to explain are firstly, the daily motion in consequence of which the sun seems to approach us from the East, passes through our field of vision and finally disappears in the West; secondly, the annual motion in consequence of which the sun seems to pass in the course of a year through the circle of the nakshatras, proceeding from the West towards the East; and thirdly the motion in declension according to which the sun ascends towards the north during one half of the year and descends towards the south during the other half. As in all systems which consider the daily motion of the sun to be real (not an appearance produced by the revolution of the earth

round its axis), the annual motion of the sun through the circle of the nakshatras is said to be apparent only, and produced by the circumstance of the motion of the sun being somewhat slower than that of the nakshatras, so that he daily lags behind by a certain quantity which accumulated during a whole year amounts to an entire revolution. How the Sūryaprajñapti supposes the first and third motions to take place will appear from the following.

It must be remembered at the outset that the general conception of the configuration of the world which we find in the Sūryaprajñapti is the same as that known from the Purāṇas. The earth is considered to be an immense circular flat consisting of a number of concentric rings, called dvīpas, separated from each other by ring-shaped oceans. In the centre of the earth stands Mount Meru; around it runs the first dvīpa—Jambudvīpa, the only one which will concern us in the following. It is surrounded by a circular ocean, the water of which is salt (the lavaṇa-samudra). The southern segment of the Jambudvīpa is occupied by the Bhāratavarsha, the northern segment by the Airāvata-varsha; east and west of Mount Meru are the two portions of the Videha-varsha. Sun, moon and stars revolve round Mount Meru, in circles of different height above the Jambudvīpa, the same heavenly body, however, always keeping the same height. The detailed features of these motions are now according to the Sūryaprajñapti as follows.

The circumstance of the sun seeming during one half of the year to approach daily more and more the north, while during the other half he seems to descend towards the south is explained in the following manner. On the longest day of the year which at the beginning of the cycle coincides with the first day of the lunar month S'rāvaṇa, the sun describes round the mountain Meru a circle, the diameter of which is 99,640 yojanas. The distance of the sun from the centre of Meru amounts therefore to 49,820 yojanas. On the next day the sun describes a circle concentric with the first, and having a diameter greater by  $5 \frac{2}{3}$  yojānas, so that the distance of the sun, from Mount Meru now amounts to  $49,820 + 2 \frac{2}{3}$  yojanas. In the same manner the diameter of the circle described by the sun increases by  $5 \frac{2}{3}$  on the third day, fourth day, etc., up to the day of the winter solstice, which according to the system is the 183rd day after the summer solstice. On this day the sun describes round Mount Meru a circle, the diameter of which is equal to 100,660 yojanas, so that his distance from Mount Meru amounts to 50,330 yojanas. Beginning from this day the solar circles contract again, by the same quantity daily by which they had expanded during the southern progress of the sun. During the 182 days intervening between the day of the winter solstice and the day of the following summer solstice the sun describes again the same 182 circles in

which he had descended towards the south, only in reverse order, until, on the day of the second summer solstice, he has again reached the innermost circle, from which he had started a year ago. During the second year the same expanding and contracting of the solar circles repeats itself and so on. The fact of the sun seeming to ascend towards the north during one half of the year, while he seems to descend towards the south during the other half is therefore explained by the supposition that he approaches us during the former half, while he recedes from us during the latter half. The system does not assume that he actually ascends or descends; for all the circles described by him are at an equal height above the Jambudvīpa; he only appears to us to stand lower at the winter solstice than he does at the summer solstice, because at the former period he has receded from us to the amount of five hundred and fifty yojanas. The exact localities too above which the sun describes his daily circles are defined. The innermost circle, *i. e.*, the circle nearest to Mount Meru, which the sun describes on the longest day, would, when projected upon the earth, be distant 180 yojanas from the outer margin of the Jambudvīpa. The second circle approaches nearer to that margin, the third still nearer, and so on, until the circles of the sun are no longer above the Jambudvīpa itself but above the salt ocean, the lavanoda, which surrounds the Jambudvīpa. Finally on the shortest day of the year the sun describes a circle which, in projection, is distant 330 yojanas from the edge of the Jambudvīpa. After that he again approaches the Jambudvīpa, and on the next summer solstice he has again entered into it to the amount of 180 yojanas. The technical term by which this recurring progress of the sun towards the Jambudvīpa and the salt ocean is denoted in the *Sūryaprajñāpti*, is उगच्छ or अवगच्छति (-ते); the sun is said to merge himself, or to enter to a certain distance into the Jambudvīpa or into the salt ocean accordingly as his circles are vertically above the land or the surrounding sea.

In connexion with the sun's motion in circles of different diameter, the *Sūryaprajñāpti* treats of the increase and decrease of the length of the day. As in the *Jyotisha-Vedānga*, the length of the day of the summer solstice is estimated at eighteen *mūhūrtas*, that of the shortest day at twelve *mūhūrtas*. The days between the two solstices are erroneously supposed to decrease or increase by a uniform quantity, which is easily found to be equal to  $\frac{1}{18} = \frac{1}{24}$  of a *mūhūrta*.

A number of opinions of other teachers agreeing with the theory stated above in its general features, but differing in the figures, are likewise given by the *Sūryaprajñāpti*.

Different opinions regarding the extent of the solar circles are given in I, 8 and, which comes to the same, different opinions about the distance of the two suns from each other in I, 4. According to this chapter there

were six different opinions about the distance of the two suns from each other on the longest day when the sun—or the two suns—describe the innermost and smallest circle. According to some teachers, the distance of the two from each other, or in other words the diameter of the circle they describe amounts to 1,133 *yojanas*, according to others to 1,134 *yojanas*; according to others again to 1,135 *yojanas*. Most probably we have to combine with these statements the statements given in the next chapter (I, 5) regarding the different opinions prevailing on the extent to which the sun “immersed” himself into the Jambudvīpa and into the salt ocean. There we read that, according to one opinion the sun moves on the longest day in a circle which projected on the Jambudvīpa is distant 1,133 *yojanas* from the edge of the latter, while on the shortest day he describes a circle above the salt ocean at the distance of 1,133 *yojanas* from the Jambudvīpa. According to the opinions of two other sets of teachers, the number of *yojanas* in both cases is 1,134 and 1,135. If we combine these measures with the measures of the diameter of the innermost solar circle given above (and the sameness of the figures seems to entitle us to do so, although this is by no means explicitly stated), we get for the diameter of the whole Jambudvīpa  $1,133 (= \text{diameter of the innermost circle}) + 2 \times 1,133 (= \text{distance of the innermost circle from the edge of the Jambudvīpa on both sides})$ , therefore altogether 3,399 *yojanas*; or, starting from the numbers 1,134 and 1,135, 3,402 or 3,405 *yojanas*. These are very moderate dimensions compared with the 100,000 *yojanas*, which length the author of the *Sūryaprajñapti* himself attributes to the diameter of the Jambudvīpa, and we shall not be mistaken in ascribing to opinions of this nature a considerably greater antiquity than to those represented by the *Sūryaprajñapti*. Besides, there is another circumstance in favour of such a view. The *Sūryaprajñapti* throughout makes use of the relation  $\sqrt{10} : 1$  for calculating the circumference of a circle. Thus for instance the diameter of the Jambudvīpa being 100,000 (*yojanas*), its circumference is said to amount to 316,227 *yojanas* 3 *gavy.* 128 *dhan.* 13½ *aṅg.* But those teachers who stated the diameter of the innermost solar circle to amount to 1,133 or 1,134 or 1,135 *yojanas* stated at the same time that its circumference amounts to 3,399 or 3,402 or 3,405 *yojanas*, *i. e.*, they made use of the relation 3 : 1 for calculating the circumference of a circle from its diameter. The adoption of this very rough approximate value seems to point back to a comparatively ancient time.\*

\* It seems that all Jaina books take  $1 : \sqrt{10}$  as expressing the relation of the diameter to the circumference. See for instance *Bhagavatī Sūtra* II, 1. 45 (Weber, p. 264), where, however, some confusion seems to have crept into the figures. The old and simple relation 1 : 3 is found for instance in the *Bhūmiparvan* contained in the *Bhīṣmaparvan* of the *Mahābhārata*. There the circumferences of the planets are

Three more opinions concerning the distance of the two suns from each other on the longest day are quoted. According to the first, one whole dvīpa with the addition of the surrounding ocean intervenes between the two; according to the second two dvīpas and two oceans; according to the third three dvīpas and three oceans. The distance in yojanas is not given. Two more opinions concerning the extent to which the sun enters into the Jambudvīpa are stated; according to some the sun enters on the longest day into half the Jambudvīpa and on the shortest day into half the salt ocean; the distances in yojanas are not mentioned. And according to others the sun enters neither into the Jambudvīpa nor into the salt ocean, but moves in the interval (apāntarāla) of the two; how we have to imagine this interval does not appear.

The eighth chapter of the first book contains a long exposition of the dimensions of the circles described by the sun. Four different dimensions are stated. Instead of simply giving the length of the diameter, the length and breadth (āyāma and vishkambha) are given; these two are of course equal in a circle. Then the circumference of the circle is given, according to the ratio  $\sqrt{10} : 1$ , and finally the "vāhalya," the thickness of the circle, i. e., the diameter of the space filled by the mass of the sun or more simply the diameter of the sun himself. This amounts according to the *Sūryaprajñapti* to  $\frac{1}{10}$  of a yojana. The diameter and the circumference of the circles are of course continually changing, the circle described on the longest day having the smallest dimensions and that described on the shortest day having the greatest. The dimensions of the small circle and the amount of the daily increase have been mentioned above; it is therefore not necessary to follow the Commentator into the very tedious calculation of the dimension of each daily circle. The opinions of three other teachers on the dimensions of the circles, according to which the diameter amounts to 1,133 yojanas etc., have already been mentioned; the thickness of the circle, i. e., the diameter of the sun is held by them to amount to one yojana.

We turn now to the statements regarding the velocity with which the sun moves in his different circles, and among these at first to those made by the *Sūryaprajñapti* itself. The calculation is a very simple one. Each daily circle being described by two suns, each of which travels through half of it in thirty muhūrtas, the whole circle is described by one sun in sixty muhūrtas, and consequently we have, in order to find the velocity of the sun, to divide the periphery of the daily circle by sixty; the quotient is the number of yojanas travelled through by the sun in one muhūrta. Thus the sun, when travelling in the smallest innermost circle, the circumference

stated in numbers which are the threefold of the numbers expressing the diameters :  
 अत्रमात्रं सूर्यादि राजनेकाद्वयं भुजः । विष्णुकोनं कुक्षये च यत्किंचित् सप्तसहस्रं etc.

of which is 315,089 yojanas long, passes in one muhūrta through 5,251  $\frac{1}{3}$  yojanas. On the following day both suns travel in the second circle which is somewhat larger than the first one, and consequently the suns having to describe a larger space in the same time, *i. e.*, during the duration of a nycthemeron travel somewhat faster, pass in one muhūrta through 5,251  $\frac{1}{3}$  yojanas. Thus day after day the speed of the two suns is increasing in accordance with the continually increasing extent of the diurnal circles, until on the day of the winter solstice both suns travelling in the outmost circle pass through 5,305  $\frac{1}{3}$  yojanas in one muhūrta. Beginning from this day their speed diminishes as they are again approaching the innermost circle, until on the day of the next summer solstice their rate of speed is again at its minimum. In connexion with this discussion of the swiftness of the sun, the Sūryaprajñapti treats of the question of the distance from which the light of the sun becomes visible to the inhabitants of the Bharata-varsha. By this distance we have, however, to understand not the distance of the sun from the Bharata-varsha in a straight line, but rather that part of the sun's daily circle which lies between the point of the sun's rising and the meridian. It is well known, says the Commentator, that the sun becomes visible to the eye of man at a distance equal to half of the extent (kshetra) over which he travels during the whole day, *i. e.*, at the time of his rising, his distance from us (=from our meridian, although this is not expressly stated in the Sūryaprajñapti) is half of the arc which he describes during the whole day. The length of this arc has to be measured simply by the time which the sun takes to travel through it. Thus, for instance, on the longest day the sun is visible to the inhabitants of the Bharata-varsha during eighteen muhūrtas out of thirty; from the moment of his rising he will therefore take nine muhūrtas to come up to the point straight in front of us (to the meridian). Now we have seen before that on the longest day the sun travels over 5,251  $\frac{2}{3}$  yojanas in one muhūrta; consequently he travels in nine muhūrtas over 47,263  $\frac{1}{3}$  yojanas. This therefore is the distance—expressed as an arc of the diurnal circle—at which he becomes visible to the eye of man. On the shortest day on the other hand the sun is visible for twelve muhūrtas only; we have therefore to multiply the amount of his motion in one muhūrta by six in order to find the distance at which he first appears to the eye of man on that day.

Regarding the swiftness of the sun four other opinions are recorded by the author of the Sūryaprajñapti. According to some teachers, the sun travels in one muhūrta over six thousand yojanas, and as far as it appears this rate of motion is the same in whatever circle the sun is moving. How these teachers accounted for the fact of the sun taking the same time to travel through a large circle as through a small one is not explained. The

amount of space illuminated on each day (the *tāpakshetra*), expressed as arc of the diurnal circle of the sun, they calculated in the same manner as the author of the *Sūryaprajñapti*, *viz.*, by multiplying the amount of motion in one *muhūrta* by the number of the *muhūrtas* of the day. Thus the *tāpakshetra* on the longest day would amount to 108,000 *yojanas*, that on the shortest day to 72,000 *yojanas*. According to the opinions of two other schools, the motion of the sun in one *muhūrta* amounts to 5,000 *yojanas* or 4,000 *yojanas*. Here too nothing is said about any variation in the sun's speed at different times of the year. The *tāpakshetra* is calculated in the manner stated above. The last opinion mentioned is that of some teachers who held the rate of speed of the sun to be different during different periods of the day. According to them, the sun passes over six thousand *yojanas* in the *muhūrta* after his rising and in the *muhūrta* preceding his setting, over four thousand *yojanas* during the *muhūrta* in the middle of the day and over five thousand *yojanas* in all other *muhūrtas*.

The various opinions prevailing with regard to the rising and setting of the sun are detailed in the first chapter of the second book. The opinion of the author clearly appears from what has already been stated. There is no real sunrise or sunset; the sun or rather the two suns revolving round Mount Meru appear to rise to the inhabitants of some particular place at the moment when they enter their field of vision, and they appear to set when they leave it. In reality they always move above the *Jambudvīpa* at the same height, estimated by the *Sūryaprajñapti* to amount to eight hundred *yojanas*. At the beginning of the *yuga* at sunrise on the first of *Śrāvaṇa* the *Bhārata* sun becomes visible to the *Bhārata-varsha* having reached the south-east point of his diurnal circle; diametrically opposite to it, *viz.*, in the north-west point of the same circle the *Airāvata* sun appears to rise to the inhabitants of the tracts north of Mount Meru. During the course of this day the *Bhārata* sun therefore illuminates the countries to the south; the *Airāvata* sun those to the north of Meru. At the time of sunset the *Bhārata* sun having passed through the southern segment of his circle disappears from the view of the people south of Meru and enters the view of those west of Meru; these latter therefore have their day while it is night in *Bhārata-varsha*. At the same time the *Airāvata* sun appears to have set to the people north of Meru and to have risen to those east of Meru. On the second day the *Bhārata* sun rises to the countries north of Meru and the *Airāvata* sun to the *Bhārata-varsha*. On the third morning the *Bhārata* sun has completed a full circle and therefore again rises to the *Bhārata-varsha* while the *Airāvata* sun again rises to the regions north of Meru. And so on *ad infinitum*. We may recall here a parallel passage from the *Viṣṇupurāṇa* (II, 8), tending to illustrate how sunrise and sunset were conceived to take place on the hypothesis of the sun (the *Purāṇas*

know of one sun only) moving round Meru. "The sun is stationed at all times in the middle of the day (*i. e.*, it is always midday at that place above which the sun is) and over against midnight in all dvīpas. In the same manner rising and setting are at all times opposite to each other in all the cardinal and intermediate points. When the sun becomes visible to any people, to them he is said to rise, and wherever he disappears from the view there his setting is said to take place. Of the sun, which is always (above the earth) there is neither setting nor rising; his appearance and disappearance are called his setting and rising."\*

The Śūryaprajñapti adds an interesting account of other views regarding the sideway-motion (*tiryag-gati*) of the sun. According to some the sun is not a divinity, but only a mass of rays which in the morning form themselves in the East into a globular shape, pass sideways along this visible world, and in the evening dissolve again in the West. This process repeats itself daily. According to others the sun is the well-known divinity; but each morning he is born anew according to his nature in the ether in the East (*svabhāvād ākāśa utpadyate*), passes along this world and dissolves (*vidhvamsate*) at evening in the ether in the West. According to others the sun is the mighty everlasting god known from the Purāṇas; in the morning he rises in the East, passes over this world, and at evening sets in the West; from thence he returns below to the East, illuminating the parts below. This—the commentator says—is the opinion of those who hold the earth to be a globe; it finds great favour at present among the tīrthāntarīyas and is thoroughly to be studied in their Purāṇas. This opinion has three sub-divisions. Some say the sun returning at daybreak from the parts below rises in the ether (*ākāśe*) and sets in the ether; others say he rises or originates (*uttishṭhati utpadyate*) in the morning on the summit of the mountain of rising (*udaya-bhūdhara-śirasi*) and perishes (? *vidhvamsate*) in the evening on the summit of the mountain of setting (*astamaya-bhūdhara-śirasi*); this repeats itself daily. (But, if he "*utpadyate*" and "*vidhvamsate*," how can he pass under the earth during the night?). Others say he rises in the morning on the mountain of rising and enters in the evening into the mountain of setting, illuminates during the night the subterraneous world and rises again from the mountain of rising. Others say, he rises, that is, originates from the eastern ocean in the morning, pe-

\* Mr. Fitz-Edward Hall (Wilson's Vishṇu Purāṇa, Vol. II, p. 242) directs our attention to the "heliocentrism" taught in this passage. But clearly there is no trace of heliocentrism to be found in it. He apparently is misled by the words **सर्वस्य सर्वतः सतः** which he translates "of the sun which is always in one and the same place." But this translation is quite untenable, since the Vishṇu Purāṇa most unambiguously teaches the sun's revolution round Mount Meru.

rises at evening in the western ocean (same objection as above); others again, he rises from the eastern ocean, enters at evening into the western ocean, passes during the night through the subterraneous world, rises again from the eastern ocean. The last opinion mentioned is not very clear and an account of it is therefore not given in this place.

The third and fourth books contain particulars about the *tápakshetra*, i. e., that part of the *Jambudvīpa* which on each day is illuminated by the sun or rather by the two suns. The shape of this *tápakshetra* the *Súryaprajñapti* compares to that of a *kalambuká*-flower turned upwards, a comparison which has to be understood in the following manner. Each of the two suns illuminates a sector of the large circle formed by the *Jambudvīpa*. These sectors are, however, not complete, but a piece is cut off from each by Mount Meru which standing in the middle of the circle repels by its own superior radiance the rays proceeding from the two suns and therefore is not included in the *tápakshetra*. The interior border of the sectors is thus formed by a part of the circumference of Mount Meru, their outward border by a part of the circumference of the *Jambudvīpa*. Between these two sectors of light there lie two sectors of shade (*andhakára*); whatever part of the *Jambudvīpa* is covered by the two former enjoys day at the time while it is night in the regions covered by the dark sectors. As the two suns revolve these four sectors revolve with them, sweeping over the whole extent of the *Jambudvīpa* and producing alternate day and night in all its parts. The relative magnitudes of the *tápakshetra* during the different parts of the year is estimated in accordance with the statements about the relative length of night and day. On the longest day the two suns, moving in the innermost circle, together illuminate three-fifths of the *Jambudvīpa*, each of them three-tenths; on the shortest day they illuminate two-tenths each, together two-fifths. On the day after the summer solstice when the suns have entered into the second circle, and are moving at a greater distance from the centre, the extent of the *tápakshetra* decreases accordingly, so that it then equals  $\frac{3}{5} - \frac{1}{5 \times 183} = \frac{3}{5} - \frac{1}{915}$  of the whole *Jambudvīpa* only; the same decrease repeats itself daily up to the day of the winter solstice when the extent of the illuminated portion of the *Jambudvīpa* has reached the minimum stated above. From that period it again begins to increase by the same portion daily. From this the absolute dimensions of the *tápakshetra* or, to express it more conveniently, of one of the two sectors composing the *tápakshetra* are easily derived. The two straight lines by which it is limited are equal in length to the radius of the *Jambudvīpa* less the radius of Mount Meru (50,000 — 5,000 = 45,000 *yojanas*). To this we find in one passage of the *Súryaprajñapti* added the sixth part of the breadth of the salt ocean surrounding the Jam-

budvīpa, up to the end of which the light of the sun seems to reach, on the longest day at least; this gives altogether  $78,333\frac{1}{2}$  yojānas ( $= 45,000 + \frac{200,000}{6}$ ). In the statements regarding\* the measure of the two arcs

limiting the sector, no reference is made to the salt ocean. We find these measures for the longest day by dividing the circumference of Mount Meru as well as that of the Jambudvīpa by ten; three of these ten parts of the first kind give the interior arc of the truncated sector, three of the second kind the exterior arc. On the shortest day we have to take two-tenths instead of three, and there is no difficulty in finding the corresponding increase or decrease on all days between the summer and winter solstice. In the same manner the dimensions of the andhakāra, the dark portion of the Jambudvīpa, are readily ascertained. Finally some statements are made about the distances to which the light of the two suns reaches above, below and towards both sides. It is said to reach to a thousand yojanas above (above the chariot of the sun, svavimānād ūrdhvam). Further it is said to reach down to the depth of 1,800 yojanas, for which the following explanation is given. The sun is at the height of 800 yojanas above the earth, and below the surface of the earth at the depth of 1 000 yojanas are the subterranean regions (adholaukikagrāmāḥ), down to which the sun's rays are penetrating. No further details about these subterranean dwellings are given. Towards both sides, the east and the west, the light of the sun is said to extend to the distance of  $47,263\frac{3}{10}$  yojanas.

For the sake of completeness, the various other opinions with regard to the subjects treated in the last paragraphs are added. Some say that the sun and moon illuminate one dvīpa and one ocean; while according to others the numbers of dvīpas and oceans illuminated are 3,  $3\frac{1}{2}$ , 7, 10, 12, 42, 72, 142, 172, 1042, 1072. No details are given. One chapter contains the enumeration of a number of very fanciful opinions about the form of the tāpakshetra, which it would, however, be purposeless to extract in this place.

On the assumption that the sun describes every day a circle which is at the distance of  $2\frac{4}{11}$  yojanas from the circle described on the preceding day, the question naturally suggested itself, how the sun passes over from one circle into the next one. This question is treated in I, 6, and II, 2 where two different opinions are expounded which, although the account given of them is not altogether clear, appear to be of the following nature. According to some the sun enters from one circle into the other, "bhedaḡhātēna" which (bheda being explained to signify apāntarāla) seems to mean that the sun passes from one circle into the next one by moving over the distance separating the two all at once. Thus the sun would really move in perfect circles and the motion across from one circle into the

other would be a momentary one only. The other opinion, and to this the *Súryaprajñapti* seems to adhere, is that the sun does not in reality move in separate perfect circles, but rather in an uninterrupted spiral line. As the *Súryaprajñapti* expresses it, the sun begins from the moment he has entered the first circle to move "*śanaiḥ śanaiḥ*" across towards the second circle, and as soon as he has reached the second circle, he begins to move towards the third circle, etc. The term "*kārṇa*" which occurs in this description of the sun's motion seems to denote the spiral line which passing across the whole room between the two circles connects the two; a line which might properly enough be called "*kārṇa*," i. e., diagonal. On this hypothesis then we should have to remember that the sun is only for convenience sake said to describe a separate circle on each day, and that in reality he is supposed to describe a continuous spiral line.

After having thus given a succinct account of the *Súryaprajñapti*'s theory concerning the motion of the sun, we now proceed to consider the statements referring to the motion of the moon.

(*To be continued.*)

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*Memorandum on Clay Discs called "Spindle Whorls" and votive Seals found at Sankisa, Behar, and other Buddhist ruins in the North Western Provinces of India.*—By H. RIVETT-CARNAC, Esq., C. S., C. I. E., F. S. A. (With three Plates.)

Last year I submitted for the inspection of the Asiatic Society specimens of stone and clay discs, similar to what are called "spindle whorls" by the Antiquaries of Europe, found by me at the Buddhist ruins of Sankisa, Behar, &c. in the Fatehgarh District, N. W. Provinces of India. Certain clay seals stamped with the Buddhist formula found in the same localities were also exhibited. The resemblance between these "spindle whorls" and those described and figured by Dr. Schliemann in his work "*Troy and its Remains*" was briefly noticed by me at the time. Since then I have obtained some more specimens of these discs and seals, and I think it well that they should be submitted for the inspection of the Asiatic Society, and that the attention of its Members and of other Antiquaries should be directed to the resemblance to be traced between these remains and those found in the ruins of Hissarlik and in many parts of Europe.

First as regards so called "spindle whorls." When we were encamped at Kanouj, Sankisa and Behar Khas in the Fategarh district, the village urchins were encouraged to bring to us everything in the shape of "Antiquities" that could be grubbed out from these extensive ruins and from neighbouring mounds. These sites, as is well known, present many features.

of resemblance to those which Dr. Schliemann dug through at Hissarlik, described at length in his work upon Troy. That is to say, it is generally found in the case above-mentioned that the site has been selected on account of some Kunker Hill which, rising out of the flat alluvial soil of the Doab, offers a point of vantage for the building of a fort or city. Here, as at Hissarlik, these sites often bear the traces of several distinct colonies. The mud buildings of one set of colonists have been razed by their conquerors or successors to build thereon houses and temples which have again been levelled to form the foundations of the habitations of later settlers. The high mounds, on which part of the present town of Kanouj is perched, is to be accounted for in this way, and there can be little doubt that if shafts were to be carried through the ruins there, after the manner adopted by Dr. Schliemann at Hissarlik, the traces of several distinct periods might be unearthed. What has been said of Kanouj holds good in regard to Sankisa, Rannuggur and other ruins. Much has not yet been done to explore these localities, and the recent interesting find of Mitra coins, reported by me to the Society, indicates that careful investigation might prove remunerative to antiquarian research. The heavy rains of India are, however, of much assistance in running amateur sections through the ruins, and in exposing from time to time relics of more or less interest. Amongst these may be classed the "spindle whorls" now to be noticed, many of which together with coins, beads, etc. are collected and set aside by the villagers as possessing some mysterious significance, and are brought out for sale when the District Officer or some occasional visitor camps near the place.

Of these clay discs and their stone prototypes four distinct classes are to be noticed :

- A. Terra Cotta Discs, plain and ornamented.
- B. Ditto with a hole through the centre.
- C. Terra Cottas "in the form of a top and the crater of a volcano" (I use the words of Dr. Schliemann, *Troy*, p. 38 to describe these peculiar specimens).

D. Clay Balls, plain and ornamented.

With respect to A, Clay or Terra Cotta discs, these were brought to us in enormous quantities, and, if disposed to do so, we might have purchased and carried off several elephant loads of this description of relic. At the time I did not attach much importance to them, and am sorry now that no careful selection was made of those bearing different styles of ornamentation. They are all of red or black clay well baked. In size they vary from 1 inch to 2 inches in diameter and are about  $\frac{1}{4}$  of an inch in thickness. The majority of them bear a rough ornamentation at the edges only, see Plate XIII, sketches 1 and 2. Others again show traces of more elaborate design and workmanship. Some of these are figured in sketches 3 to 7.

On one, No. 5 of my sketch, will be seen the broad arrow noticeable on Schliemann's No. 458. On another, No. 6, is what looks like the sign of Saturn or what Dr. Schliemann calls the "mystic rose," well known on Buddhist coins and in Buddhist art. They all have more or less ornamentation at the edges, resembling the spokes of a wheel or possibly the rays of the sun.

I also obtained at Sankisa several stone discs of nearly the same shape as the Terra Cottas. They are all highly polished. One is of black marble, another of crystal. Several are of red marble, and the material must have been brought from a distance, as no stone save kunkur is to be found within many miles of Sankisa. It will be noticed that all these stone specimens are grooved at the edges, see the section in sketch No. 8, whereas but few of the clay specimens have received such treatment.

Type B, sketch No. 9, on Plate XIV consists of clay discs similar in most respects to the foregoing, save that a hole has been drilled through the centre of each. I did not pay any particular attention to the proportion in which these different classes were brought to me in camp. But I find that I have many more of the plain discs than of those which have been pierced. There can be little doubt, however, that many hundreds of the pierced ones might have been obtained on the spot, and I am sending to ascertain whether any more ornamented specimens are procurable. The specimen marked and figured in sketch No. 10 is of grey granite. It bears the same relation to the pierced clay discs as the stone and crystal discs mentioned above bear to the clay whorls of type A. In the centre is a hole, round which are six concentric circles.

The specimen figured in sketch No. 11, is of a somewhat different type from the foregoing, as a section of the sketch will explain. The impressions of the spokes of a wheel with dots between each spoke appear to have been made in a stamp or mould. I find I have only two of this class in my collection. But doubtless hundreds more might have been obtained had I not been afraid of burdening myself during the march with too large a collection of such specimens.

Of type C, Sketches Nos. 12 and 13, on Plate XIV, which may be described in Dr. Schliemann's words as being in the form of a "top or crater of a volcano" I have, I find, but 4 or 5 specimens; I have little doubt that large numbers were offered to me, but at the time they did not appear to possess any particular significance. It was only in tumbling out a large number of discs from the box, in which they had long been kept, that I recognised this type of the illustrations of Dr. Schliemann's book, just consulted with reference to the Discs A and B mentioned above. The specimens I have with me do not bear any marks of ornamentation. Further search may perhaps bring better specimens to light. (Since this was written some ornamented ones have been found.)

Lastly we have type D, Clay Balls, Plate XIV, sketches Nos. 14, 15, 16, resembling somewhat those figured by Dr. Schliemann. Several of them are roughly ornamented, and the designs, such as they are, will be seen from the sketches.

I hardly know how it happened that these specimens were carried away by me. Certainly no importance was attached to them at the time; and they would have escaped my notice altogether, had I not seen, when comparing the clay discs, the sketches of somewhat similar balls figured in the last pages of Dr. Schliemann's book.

Lastly, I have also figured two specimens Nos. 17 and 18 which seem to approach type C. And an enamelled glass bead No. 19.

This bead is similar to that figured in Thomas' Prinsep, Pl. IV, No. 13. These beads are found in large quantities together with crystal, onyx cornelian and others at Sankisa and similar ruins. It seems desirable to figure the specimen with this paper in order to ascertain whether similar ones are found in Europe or elsewhere. The village urchins during the rains make a practice of collecting these beads, and they are usually given to *fakirs* or devotees. Seeing such a necklace worn by an old *fakir* led me to enquire whence the beads came. And I had little difficulty in procuring a variety sufficient for about nine necklaces.

I have now to direct attention to the resemblance between the specimens above described and figured, and those discovered by Dr. Schliemann at Hissarlik and noticed at great length and figured in large numbers in his well known work upon Troy.

As regards type A, clay discs more or less ornamented, without the central hole, I cannot be quite certain that this type was found by Dr. Schliemann. I do not see that any distinct mention is made of unpierced discs, and it is not quite clear from the sketches in Dr. Schliemann's work, whether, what is referred to as the Central Sun on the Discs figured in plates 22 and 23, is a hole drilled through the centre or is a depression or ornamentation representing the sun. Still, even if this particular type was not found at Hissarlik, it is found in Italy, and, as will be shewn further on, the resemblance between the remains found at Hissarlik and those of Italy is referred to by Dr. Schliemann.

Dr. Schliemann writing of his discoveries at page 187 of his work above quoted, thus refers to the discs:

"During the last few days we have also found, in the strata next above the primary soil, at a depth of from 46 to 36 feet, a number of round brilliant black terra cottas of exquisite workmanship; most of them much flatter than those occurring in the higher strata and resembling a wheel; many are in the shape of large flat buttons. But we also meet with some in the form of tops and volcancoes which differ from those found in the higher strata only by the

fineness of the terra cotta and by their better workmanship. The decorations on these very ancient articles are, however, generally much simpler than those met with above a depth of 10 meters (33 feet) and are mostly confined to the representation of the sun with its rays, or with stars between the latter, or of the sun in the centre of a simple cross, or in the middle of four or five double or treble rising suns. At a depth of 6 meters (20 feet) we again found a round Terra Cotta in the form of a volcano, upon which are engraved three antelopes in the circle round the sun.

"At a depth of from 5 to 8 meters (16½ to 26 feet) a number of terra cotta balls were found, the surface of each being divided into eight fields; these contain a great many small suns and stars, either enclosed by circles or standing alone. Most of the balls, however, are without divisions and covered with stars; upon some I find the swastika and the tree of life, which, as already said, upon a terra cotta ball found at a depth of 26 feet, had stars between its branches." (Schliemann's *Troy*, p. 187.)

The above extract embraces not only the so-called spindle whorls, but mentions the volcano-shaped "whorls" of type C found at Sankisa and type D brought away by me from the same place. The discs were found by Dr. Schliemann of terra cotta, of marble and of crystal. So at Sankisa did we find clay, marble and crystal discs.

A comparison of the Plates appended to Dr. Schliemann's volume with the specimens submitted by me and the sketches which accompany this paper will, I think, shew that there is at least some resemblance between the remains found at Hissarlik and those at Sankisa.

On nearly all these discs will be seen what are constantly referred to as the spokes of the wheel or the rays of the sun. I have placed side by side with my sketches a copy of the whorl engraved by Dr. Schliemann at page 137. It might fairly be taken to be a representation of the whorl given in Plate XIV, Sketch 10 appended to this paper.

Then my collection is unfortunately in no way large or complete. When at Sankisa, I had little idea of the significance of these remains or their resemblance to well known types, and I only purchased a few of them in the manner that I collect everything that seems to be unusual or strange. Further search may possibly bring out even more remarkable points. The few specimens that I have succeeded in obtaining bear, however, a resemblance, not only in shape, but also in ornamentation, to those figured by Dr. Schliemann, sufficient to render the subject interesting. The broad arrow of my Sketch No. 5 and the Mystic Rose or sign of Saturn, or the numeral four of my Sketch No. 6, are all to be traced among Dr. Schliemann's specimens; and then again on the balls some similarity in ornamentation is to be traced.

It would perhaps hardly be right to attach much importance to the

fact, that one or two clay discs were found in Buddhist remains in India, and that discs of somewhat the same type were unearthed at Hissarlik. But here we have, not only pierced discs of type B, but the Volcanoes C and the Balls D, all three types resembling in some degree the three types of Hissarlik and all three types bearing somewhat similar forms of ornamentation.

Again it is to be noticed that the remains at Sankisa are undoubtedly Buddhist. Sankisa as is well known was a celebrated place of pilgrimage, being sacred as the spot at which Buddha is supposed (as described by General Cunningham, Vol. I, *Archæological Reports*) "to have descended from the Trayastrinsa heaven by the ladder of gold or gems, accompanied by the gods Brahmá and Indra."

The place was visited and described by the Chinese pilgrim Fa Hian early in the 5th century, and by Hiquen-Thsang in the 7th century A. D. A detailed account of these interesting ruins will be found in General Cunningham's *Archæological Report* above alluded to.

Now the ornamentations on the Terra Cottas of Hissarlik, if they are not Buddhist, certainly bear a close resemblance to the ornamentations on coins, buildings, etc., which in India are generally supposed to be Buddhist.

Thus the wheel continually recurs in Schliemann's sketches, together with the Swastika. And what Schliemann calls the Mystic Rose, and Fergusson the Trisul ornament is quite as frequent. The Sacred Tree, the Fire Altar and the Deer are also almost as common. In fact, we have every one of the Buddhist symbols of the well known type of the so-called Buddhist coin, figured in No. 1, Plate IV, Thomas' Prinsep, and of which an engraving is given at page 17 of Fergusson's *Indian and Eastern Architecture*. Mr. Fergusson points out, however, that there is some doubt whether these symbols really are Buddhist, and at the page above referred to, writes, "One coin of the period is well known. It belongs to a king called Kunanda or Krananda generally assumed to be one of the nine Nandas with whom this dynasty closed. In the centre on one side, is a dagoba with the usual Buddhist Trisul emblem over it, and a serpent below it: on the right the sacred Tree, on the left the Swastika with an altar (?) on the other side a lady with a lotus (Sri ?) with an animal usually called a deer, but from its tail more probably a horse, with two serpents standing on their tails over its head which have been mistaken for horns. Over the animal is an altar, with an umbrella over it. In fact a complete epitome of emblems known on the monuments of the period, but savouring much more of Tree and Serpent worship than of Buddhism as it is now."

Dr. Schliemann at page 38 of his work refers to the resemblance between the Terra-Cottas of Hissarlik and those of Italy. This directed my attention to Gastaldi's work. The following extract will show that if it be considered that the resemblance between the remains at Sankisa

and Hissarlik is not established, such doubt can hardly exist regarding the Indian and Italian remains.

Gastaldi says: "There are very many of these objects, for the greater part of Terra-Cotta, more or less discoidal, or conical, or spheroidal, pierced in the centre, to which the Archæologists of France and Germany, as well as our own, have given the name of spindle-whorls. The paste of the spindle-whorls is not, for the most part equal to that of earthenware; instead of the grains of sand, we find powdered carbon and ashes; the colour is ashy in the internal parts, and ash colour varying into yellow and red on the outside. Some few spindle-whorls are black, and of a substance probably similar to the thinner vases, and, like a great number of these, are shining externally as if with varnish. They are very various in form; and although eight different ones have been represented by you, from those which, in the course of the summer, we sent from Campeggine, courteously presented by the brothers Cocconi, not one represents the other six, collected in the sequel, in the marl-beds. Some few bear marks scratched upon them, and are among those you have had engraved (Fig. 25).

"Besides all the spindle-whorls of earth, there were dug up from the marl-beds of Castellazzo di Tontanellato, three others, which are cut out of different substances. One was made out of a stag's horn, it is in the shape of a cone, and is very highly polished; the second of stratite, of a greenish tint, and spheroidal; the third, of a whitish limestone (calcare), is disc-shaped, brought to a high degree of polish, and certainly manifests an advanced epoch in art among the people who used such implements. Among the objects in the Museum of Antiquities at Parma, which are of uncertain derivation, there are twenty spindle-whorls, some in limestone, stratite, and even amber, but the greater part of earth; some are polished, some are ornamented with circles, concentric with hole pierced in them, or in concentric lines disposed in groups on the back of the spindle-whorl. We find among these the transition from the more depressed discoidal form, almost medallion (nummulik) to the acute conical. Some one of those in terra cotta is said to have been collected from the ruins of the Roman City of Velieia. The different forms, finish and substances of the spindle-whorls would lead us to suppose that they must have served for various uses in proportion to their diversity; perhaps the most beautiful and carefully worked were amulets, or else buttons; the others weights, used either for nets or in weaving."

"Besides all the earthenware and all the spindle-whorls which we have spoken of, we meet in the marl-beds with other small objects in earth, badly baked, in form disc-shaped, without any hole, sometimes ball-shaped (pallottola), of which it is impossible to divine the use which they served."

(Lake Habitations and Prehistoric Remains in Northern and Central Italy. B. Gastaldi, pp. 44, 45, 46, 47.)

In Italy these mysterious articles are found of clay and marble, as in India. The ornamentation is the same and in Italy also are found the disc-shaped *Terra Cottas* *without any hole* similar to those of North Western India. It is hardly necessary to burden this paper with any more sketches. The Italian remains are almost exactly the same as those of Schliemann, but I cannot resist the temptation of copying the specimen marked 8 B which will be found figured at p. 45 of Gastaldi's work. It is almost identical with No. 12 of those figured by me.

Next as to the use to which these remains were placed. Dr. Schliemann discusses the subject at length in several places in his valuable work on Troy. And it will be seen that Gastaldi is puzzled as to their significance. Dr. Schliemann arrives at the conclusion that, although some of them may have been used as spindle-whorls, the greater number of them were votive offerings. And Gastaldi considers that some at least were amulets. The symbols on most of those found at Hissarlik would seem to leave little doubt of their religious character. Of the Indian specimens, it is not easy to say why some should have the central hole and others should be unpierced. But, if they are votive offerings, the fact that the pierced ones were found in smaller quantities at Sankisa than those without the hole, may possibly be explained by a practice, which was noticed by me years ago at some shrines of pilgrimage in the Central Provinces. There the pilgrim, when he makes a vow or implores a favour, smeares his right hand with red colouring matter, and impresses it, fingers upwards, on the wall of the temple, leaving there a mark like the Red Hand of Ulster. If the favour, the birth of a child or whatever it may be, is granted by the presiding deity, the pilgrim is supposed to return to the shrine the following year, and to impress on the wall a similar mark, the fingers of the hand this time pointing downwards. It was very noticeable that the latter marks were well in the minority, and it was carefully explained by the local priests that this was not to be accounted for by the supposition that the deity was slow in his favours, but that, in truth, the suppliants, when they had obtained what they wanted, were not always mindful to return and to fulfil their vows. Perhaps in this way the proportion of the unpierced to pierced discs may be explained. The unpierced ones being offered when a favour was implored, the pierced ones when it was obtained.

Be this as it may, the view that these discs are votive offerings is supported by the religious character of the symbols, already alluded to, found on the whorls of Hissarlik and Sankisa. Since I commenced to write this paper, I have received a copy of Alabaster's "Wheel of the Law." At Fig. 8 A will be found a copy of the sketch of the Buddhist wheel of the

law given in that work. And it is almost unnecessary to point out the resemblance which the highly ornamented Disc No. 7 bears to this sketch. The other discs, though not so elaborately ornamented, seem to adopt the same idea. No. 11, as far as ornamentation is concerned, undoubtedly resembles a wheel, though, as the section will show, it can never have been used, as some of my friends have suggested, as the wheel of a toy cart; nor indeed are there any marks of wear on any of the wheel-shaped discs to support the view that they were used for miniature playthings of this description. It seems much more probable that they were votive offerings intended to represent, more or less the Buddhist wheel of the law, similar to that stamped on some of the coins recently submitted by me to the Society.

The view that these were indeed votive offerings, and not toy cart wheels or *pachisi* or draughtsmen, as some have suggested, is further borne out by the large numbers of clay discs, of a somewhat similar type, but bearing on them the well known Buddhist formula, found in the same neighbourhood. These seals, as they have sometimes been called, from their bearing a seal-like impress, have been figured by Moor in his Hindu Pantheon and have been described by General Cunningham, by Dr. Rajendralála Mitra, C. I. E. and others. General Cunningham, if I remember right, found large quantities of such "seals" made of lac in the Buddhist ruins of Behar. Though my stay at Sankisa was short, I succeeded in obtaining a considerable number of these seals. Many of them are from the same stamp. Others from different moulds bear the same well known formula commencing "*ye dharma hetavo*." The character of the legend in all these cases is comparatively modern. Those, however, marked 1 and 2 Plate XV bear the formula in the Gupta character. Others again marked 3 to 6 are deserving of notice from the variety of their ornamentation. They would seem all to have been made and stamped, in what I may call, a cushion-like fashion, after the manner of the quaintly-shaped Mitra coins recently submitted by me to the Society. Some of these seals are I think worthy of being figured in the Society's Journal.

There can be little doubt that these so-called seals, bearing the Buddhist formula, are votive offerings. A friend of mine, Mrs. Murray-Aynsley who recently travelled through a portion of Ladakh, brought me thence two stones, one inscribed with a portion of the Buddhist Formula, Plate XV, No. 7, the other bearing a conventional ornamentation. That these stones are offered in the present day, will be seen from the following extract from Mrs. Murray-Aynsley's work entitled "*Our Visit to Hindostan, Kashmir and Ladakh*," p. 88.

"We there first saw some of the walls called *Mánés*, which are formed of stones placed one upon the other without any mortar, and are

usually about four feet high, and four feet wide. Some of these walls are as much as a quarter of a mile in length, and are made, we were informed, with the following object. When a Buddhist undertakes a journey, or makes a vow, he chooses a flat stone, takes it to a monastery, and gets a lama (or monk) to engrave some rude characters upon it, which are said to be usually, 'Om mani padme Om,' which has been translated to mean, 'All hail to the jewel in the flower of the lotus!' though some give other interpretations to these words. When his stone is thus prepared, the individual places it on the top of one of these walls, which on their upper surface are almost covered with such engraved stones. Thibetans when passing these walls, always keep them on their right hand, and frequently go out of their direct road in order to do this."

There would seem, then, to be little doubt that the Terra-Cottas, plain and ornamented, and those also bearing the formula of the Buddhist faith, were votive offerings of a by-gone age.

In what little I can do to further the objects of the Society, I generally try to content myself with bringing facts to notice, and pointing out the resemblance between the remains found in India and those discovered in other parts of the world. It must be left to those who are better informed than myself, or who are more fortunate in being able to consult what has been written by authorities on the subject, to determine whether there is any real significance in the resemblance between the remains found at Sankisa and those of Hissarlik and Italy. I am not unprepared for the argument that a knife is a knife all the world over, and that this form of implement must have suggested itself to all people at an early stage of civilisation; and that the fact of implements in the form of knives having been found at Hissarlik and at Sankisa would not be sufficient to establish any connection between the settlers at these widely separated sites. It may also be urged that earthen spindle-whorls might naturally enough suggest themselves to different races situated far apart from one another. But surely there is something more than a chance resemblance in the several types of these remains and the style of their ornamentation? And does not the continual recurrence of, what we call, the Buddhist symbols on the Hissarlik finds, suggest the possibility of Hissarlik and Sankisa having been colonized by branches of the same race, be it Buddhist or not, one of which striking west from some point in Central Asia, found its way to the shores of the Mediterranean, whilst another, taking a southerly course, established itself in the Gangetic valley?

*Supplementary Memorandum.*

(With a Plate.)

Since writing this Memorandum on spindle-whorls, I have received from Sankisa a further consignment of these peculiar remains.

In my paper recently read before the Society I mentioned that the flat discs, plain and perforated, were to be found in large quantities. I have received a further large consignment. But the perforated ones are much less numerous than the others. It is unnecessary to send any more of these types.

Of what Schliemann calls the volcano-shaped Terra Cottas I have received several more. This bears out my view that they are numerous. Nos. 1 and 2, Plate XVa, are interesting from their decoration. The one it will be seen is decorated on the top. The other is decorated on the base with what would seem to be a flower and in a manner resembling the Hissarlik types.

I send also three more balls, Nos. 3-5. These are ornamented with stars, crosses and with lines. Several others of the same type have since reached me.

I have obtained many more clay seals of the same type as those already sent. One only marked No. 6 is different in its character from those already submitted to the Society.

No. 7, is a fragment of pottery highly ornamented with the rosette or wheel of the law, or whatever it may be, common on Buddhist remains.

I should be glad of any explanation of the peculiar piece of soapstone marked No. 8. Its ornamentation is curious. The grooves at the top will be noticed. It may possibly have been worn as an amulet.

Further enquiries are being made at Sankisa, and I hope to be able to obtain many more specimens showing various forms of ornamentation.

It has been suggested that the curious balls of various sizes with the different markings may have been intended to represent the sun, moon and stars.

I see that the genuineness of the antiquities found at Sankisa and Behar is doubted by some. But these sites do not see on an average one European visitor a year; as yet no one save myself has collected there these specimens, and so it is hardly to be supposed that the native mind has yet been sufficiently prepared to attempt to provide forgeries for a possible future trade in such articles.



*Note on some copper Buddhist coins.*—By H. RIVETT-CARNAC, Esq., C. S.,  
C. I. E., F. S. A.

(With two Plates.)

I send for the inspection of the Society, some coins, mostly Buddhist from my Cabinet, some of which may perhaps prove of interest. They will not all, I think, be found described or figured in the works most readily accessible to Members, and it is possible some of them may be new types. I am indebted to Mr. A. Carlleyle of the Archæological Survey for the readings on the coins.

Plate XVI, Nos. 1, 2. Legend *Vaisakha Devasa*. Two coins, if they may so be called, of the same type differing in size. They are evidently casts, *i. e.*, have been made in a mould prior to the time the art of stamping was discovered. On one side is the Bull taking here the place of the Elephant common to the earlier coins. The name tolerably clear above the Bull. On the obverse what looks like the Trisul of the Sanchi Topes, and the snake. I should be glad to know if this coin is known to the Society?

No. 3. Legend *Rāja Kamuda Senasa*. This coin resembles the preceding ones in several respects. The Bull again occupies the most prominent place. The legend is beneath the Bull; near the head of the Bull is the sacred tree. Behind the Bull is the snake. At first sight this has the appearance of an elaborate tail of the Bull. But a careful inspection will show that the tail is separate and quite distinct. On the obverse is the well known ornament which I think Fergusson calls the "Trisul," though it is different enough from Shiva's trident. It will be noticed that the marks on these coins have apparently been stamped in the same manner as those of the Mitras, found near Bareilly and recently submitted by me to the Society. The Bull and Legend have been stamped in, as if with a square seal, and cover but a portion of the circular piece of metal. Perhaps these coins represent some of the earliest attempts at coining?

No. 4. Legend *Aja Varmma* or *Asha Varmma*; a coin of the same type as above; the legend differing.

No. 5. Legend *Maphaba Varma*. The same remarks apply here also. The coin has been cut in two, and was just going to the melting-pot when I was fortunate enough to rescue the two pieces from a quantity of rubbish. It is to be feared that a good many coins are thus lost to us. All the above were obtained by me at Faizabad.

No. 6. *Maha Satama*. A coin apparently of the same type as above but in bad preservation.

No. 7. *Satya Mitrasa*.

No. 8. *Ayu Mitrasa.*

No. 9. *Saya Mitrasa.*

All of the well known "Cock and Bull" type, but new names I believe.

No. 10. *Yaya Mitra* (two specimens).

Plate XVII No. 11. *Vyaya Mitra.*

These coins seem much older than the preceding ones.

No. 12. (Lion) *Laranga* or *Larata* or *Lājasa*. (Tree) *Sūgāta-Yanapya*.

This coin is quite a different type from the preceding. On one side is a Lion much resembling the carvings found among the ruins of old Buddhist Temples.


No. 13. A pretty little Buddhist coin of a type I have not yet seen figured. The sacred tree is encircled by the snake forming a sort of rosette in the centre of the coin.

No. 14. These three little oddly-shaped specimens have all well stamped on one side what looks like the conventional Heraldic Lion. On the other side may be traced marks somewhat resembling the sign *Pisces* of the Zodiac.

No. 15. Two specimens of a coin which is perhaps new. On one side what looks like a Fish as in the preceding coins, on the other a Thor's Hammer (?) or perhaps the sign of Saturn combined with some other sign in such a manner as to form a monogram?

No. 16. Three little coins of sorts.

I should be glad for information regarding the dynasties, dates, &c., of these coins.





# APPENDIX

## TO "A COLLECTION OF HINDÍ ROOTS."

### INDEX OF SANSKRIT ROOTS AND WORDS OCCURRING IN PAGES 33—80.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>अ. a.</p> <p>✓<u>achh</u> 40.<br/> ✓<u>aj</u>; abhi—80.<br/> ✓<u>anj</u>; abhi—80.<br/> ✓<u>aṭ</u> 42; abhi—57.<br/> N. aṭṭa 63.<br/> N. adhyaksha 69.<br/> N. abhyanga 75.<br/> ✓<u>ard</u>; abhi—57.</p> <p>आ. ā.</p> <p>✓<u>āp</u>; pra—35, 41, 52.<br/> sam—61.</p> <p>इ. i.</p> <p>N. ichchhá 45, 66.<br/> ✓<u>ish</u>; pra—80.<br/> ✓<u>i</u>; pari—53.</p> <p>ई. ī.</p> <p>✓<u>iksh</u>; pari—51.</p> <p>उ. u.</p> <p>N. uchcha 63.<br/> P. utkriṣṭa 64.<br/> N. utsāha 45, 66.<br/> N. udvam 63.<br/> P. upaviṣṭa 37, 74.</p> <p>ऋ. ṛi.</p> <p>✓<u>ṛi</u>; adhi—79.<br/> sam—62.</p> <p>क. k.</p> <p>✓<u>kath</u> 43.<br/> ✓<u>kamp</u> 43.<br/> N. kardā 64.</p> | <p>N. karma 64.</p> <p>✓<u>kāl</u>; nis—72.<br/> ✓<u>kash</u> 43.<br/> N. kasha 37, 64.<br/> ✓<u>kas</u>; nis—50.<br/> ✓<u>kāri</u> (causal) 36 bis.<br/> ✓<u>kās</u> 43.<br/> ✓<u>kunch</u>; ni—50.<br/> ✓<u>kuṭ</u> 43; avu—43.<br/> ✓<u>kuṭṭ</u> 43.<br/> ✓<u>kup</u> 35, 43.<br/> ✓<u>kṛi</u> 35, 37, 43, 47, 48.<br/> ✓<u>kṛit</u> 43.<br/> ✓<u>kṛish</u> 35, 39, 43, 78;<br/> ut—42.<br/> ā—40, 78.<br/> P. kriṣṭa 64.<br/> ✓<u>kṛi</u> 43; vi—35, 36, 55.<br/> ✓<u>kṛiḍ</u> 44.<br/> ✓<u>kṣhap</u> 43, 79.<br/> ✓<u>kṣham</u> 79.<br/> ✓<u>kṣhamap</u> 79.<br/> ✓<u>kshar</u> 64; ni—50.<br/> ✓<u>kṣhal</u> 64.<br/> ✓<u>kshi</u> 43, 46.<br/> ✓<u>kship</u> 44, 65.<br/> P. kṣhipta 65, 66, 67 bis.<br/> ✓<u>kshu</u> 67.<br/> N. kshut 67.<br/> N. kshubb 69.<br/> ✓<u>kshur</u> 44.<br/> N. kshēpa 69.<br/> ✓<u>kshai</u> 56; vi—ava—56.<br/> ✓<u>kshot</u> 44 bis, 67, 68.</p> | <p>ख. kh.</p> <p>✓<u>khād</u> 34, 35, 43.<br/> ✓<u>khid</u> 44.<br/> ✓<u>khud</u> 44 <i>tris</i>.<br/> ✓<u>khunḍ</u> 44.<br/> ✓<u>khur</u> 44.<br/> ✓<u>khot</u> 44.<br/> ✓<u>khoḍ</u> 44.<br/> ✓<u>khōr</u> 44.<br/> ✓<u>khol</u> 44.</p> <p>ग. g.</p> <p>✓<u>guchh</u> 40; ā—34, 41.<br/> ✓<u>gaṇ</u> 44.<br/> ✓<u>gum</u> 44.<br/> N. garta 64.<br/> N. garda 65.<br/> ✓<u>garh</u> 44.<br/> ✓<u>gaḷ</u> 44; api—52.<br/> ✓<u>gaḷh</u> 44.<br/> P. gādha 65.<br/> ✓<u>guph</u> 44.<br/> ✓<u>gri</u> 44.<br/> N. gorda 65.<br/> ✓<u>gai</u> 44.<br/> ✓<u>granth</u> 44.<br/> ✓<u>grah</u> 44, 45.<br/> ✓<u>glunch</u> 44.</p> <p>घ. gh.</p> <p>✓<u>ghaṭ</u> 44 bis; ud—42.<br/> vi—55 bis<br/> ✓<u>ghaṭṭ</u> 44, 45.<br/> ✓<u>ghuṇ</u> 45.</p> |
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 ✓ $\overline{paṣ}$  34, 49.  
 N. paṣchāttāpa 72.  
 ✓ $\overline{pā}$  52.  
 ✓ $\overline{pā}$  52 (*drink*).  
 N. pāniya 73.  
 N. picchcha 73.

N. picchchita 73.  
 N. picchchhala 73.  
 N. picchchhila 73.  
 N. pinaddha 73.  
 ✓ $\overline{piśh}$  37, 52 *bis*.  
 P. piśhta 37, 73, 74.

✓ $\overline{piḍ}$  52 *bis*.  
 N. puṇya 74.  
 ✓ $\overline{push}$  52.  
 ✓ $\overline{pūj}$  52.  
 N. pūtākāra 73.  
 ✓ $\overline{pṛi}$  52.  
 ✓ $\overline{pṛi}$  52.  
 P. prakṛishṭa 72.  
 ✓ $\overline{prachh}$  52.  
 N. prapancha 73.  
 P. pravishṭa 34, 37, 72.  
 ✓ $\overline{preksh}$  34, 38.

फ ph.

✓ $\overline{phal}$  53.  
 N. phūt 74.  
 N. phūtākāra 73.  
 ✓ $\overline{phel}$  53.

ब b.

✓ $\overline{badh}$  54.  
 ✓ $\overline{bandh}$  54 *bis*.  
 ✓ $\overline{bādḥ}$  54.  
 ✓ $\overline{budh}$  33, 35, 36 *bis*;  
 . sam—61.  
 ✓ $\overline{brū}$  56, 74.

भ bh.

✓ $\overline{bhaksh}$  57.  
 P. bhagna 75.  
 ✓ $\overline{bhaj}$  57.  
 ✓ $\overline{bhanj}$  35 *bis*, 57 *bis*.  
 ✓ $\overline{bhan}$  57.  
 ✓ $\overline{bhal}$  57.  
 ✓ $\overline{bhash}$  80.

✓ $\overline{bhās}$  57.  
 ✓ $\overline{bhīd}$  55, 57.  
 ✓ $\overline{bhuḥ}$  57.  
 ✓ $\overline{bhū}$  35, 40, 63;  
 ud—43.  
 pra—52.  
 P. bhūrṇa 75.  
 ✓ $\overline{bhṛi}$  57; ud—42.  
 sam—61.  
 ✓ $\overline{bhṛiṃṣ}$  57.  
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 P. bhrashta 75.

म m.

✓ $\overline{mach}$  57.  
 ✓ $\overline{manch}$  57.  
 ✓ $\overline{math}$  58.  
 ✓ $\overline{man}$  58 *bis*.  
 N. mantra.  
 ✓ $\overline{mā}$  58.  
 ✓ $\overline{mārg}$  35, 36, 58.  
 ✓ $\overline{mārj}$  58.  
 ✓ $\overline{mīl}$  58.  
 ✓ $\overline{mish}$  58.  
 ✓ $\overline{much}$ ; pra—54.  
 ✓ $\overline{muṇḍ}$  58.  
 N. mudrā 76.  
 ✓ $\overline{muh}$  58.  
 ✓ $\overline{mū}$  76.  
 N. mūtra 76. •  
 P. mūna 76.  
 ✓ $\overline{mūsh}$  58.  
 ✓ $\overline{mṛi}$  58 *bis*.  
 ✓ $\overline{mṛij}$  57. 55.  
 P. mṛita 70.  
 ✓ $\overline{mṛid}$  58 *bis*.  
 ✓ $\overline{mṛiṣ}$  57, 58, 70.

P. mrishta 75, 76.

N. mauna 76.

N. maula 76 *bis*.

य ऽ.

✓yá 41, 46; á—34, 41.

P. yukta 65, 67, 68.

N. yugma 68.

✓yudh 46.

N. yoktra 68.

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P. rakta 76.

✓raksh 58, 59.

N. rangā 76.

✓rach 58.

✓raj 59.

✓ranj 59.

✓ram 59.

✓radh 59.

✓ring 59.

✓rish 59.

✓ruch 59.

✓ruṭ 59.

✓rud 59.

✓rudh 59.

N. rudh 37, 76.

✓rush 59 *bis*.

P. rushta 76.

✓ruh 59.

N. resha 76.

✓roḍ 59.

✓raud 59.

ल l.

✓laksh 59; vi—55

✓lag 33, 38, 59; vi—55.

N. langa 76.

✓langh 59; pra—80.

vi—55.

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✓laḍ 59.

✓lap; vi—79.

✓labh 60 *bis*; ud—42.

upa—á—79.

N. lava 76.

✓las 60; vi—55.

✓likh 60.

✓lip 60 *bis*.

✓lī; vi—55.

ni—77.

✓lunch 77.

✓luṭ 59, 60.

✓luṇṭ 60.

✓luṭh 60.

✓luṇṭh 60.

✓luḍ 59, 60.

✓lup 76.

N. lup 76.

✓lumb 77.

✓lubh 60.

✓lul 59.

✓lok; pra—vi—49.

✓loḍ 59.

N. lobha 77.

व v.

✓vach 56.

✓vanch 54.

✓vaṭ 54; nir—50 *bis*.

✓vaṇḍ; nir—50.

✓vaṇ 54.

✓vud 54, 56 *bis*.

✓vup 56.

N. vama 63.

✓vas 54; apa—43.

✓vah 54, 80; nir—50.

N. vahis 74.

N. vách 74.

N. váchya 74.

✓vāchh 54.

N. vātula 75.

✓vās 54.

N. viráva 74.

P. vilambita 74.

✓viṣ 75; pra—34, 37, 52.

upa—37, 56.

✓vish 75; pari—35, 51.

P. víta 75.

✓vpi 54, 60, 88 *bis*;

ud—42.

ni—50.

sam—61.

✓vpiṭ 54; vi—48.

vi—á—56.

✓vridh 54.

✓vriṣh 54.

✓vo 80.

✓veshṭ 75; upa—64.

✓vyach 56.

✓vyadh 55.

P. vyasta 74.

✓vraj 54 *bis*.

✓vri 55.

✓vrud 56 *bis*.

श ण.

✓śak 35, 60.

✓śad 47 *tris*, 61; ud—45.

✓śamb 69.

✓śal 61 *bis*; ut—42.

N. śápa 77.

✓śiksh 61.

✓śingh 62.

N. śít 69.

N. śítala 77.

✓śuch 62.

✓śudh 62.

✓śubh 62, 77.

N. ṣuṣhka 77.

✓ $\overline{\text{ṣṛi}}$  61.

✓ $\overline{\text{ṣobha}}$  77.

✓ $\overline{\text{ṣchyut}}$  45.

✓ $\overline{\text{ṣrā}}$  62.

✓ $\overline{\text{ṣri}}$  62.

✓ $\overline{\text{ṣrī}}$  62.

✓ $\overline{\text{ṣru}}$  35, 62.

✓ $\overline{\text{ṣlāgh}}$  61.

✓ $\overline{\text{ṣvas}}$ ; niḥ—79.

✓ $\overline{\text{ṣvi}}$  62.

श sh.

N. shṭeva 71.

स s.

✓ $\overline{\text{sanj}}$  80.

N. satra 77.

✓ $\overline{\text{sad}}$  51, 77.

N. sada 77.

N. sadṛiksha 40.

P. samāhita 77.

N. sammukha 77.

N. sara 77.

✓ $\overline{\text{sal}}$  61.

✓ $\overline{\text{sah}}$  61.

✓ $\overline{\text{sādh}}$  61.

✓ $\overline{\text{sich}}$  35, 61.

✓ $\overline{\text{siv}}$  61; pra—51.

✓ $\overline{\text{sukh}}$  36, 62.

N. sukha 77.

P. supta 77.

✓ $\overline{\text{ṣṛi}}$  61 *bis*; nis—50.

pra—51 *bis*.

N. sektra 67.

✓ $\overline{\text{sev}}$  62.

✓ $\overline{\text{skand}}$  43, 64.

✓ $\overline{\text{skund}}$  43.

✓ $\overline{\text{skhal}}$ ; á—64.

N. skhala 64.

N. stana 69.

P. stabdha 69 *bis*, 70 *bis*.

✓ $\overline{\text{stabh}}$  80.

N. stabh\* 70.

✓ $\overline{\text{stambh}}$  48 *bis*, 69.

N. stambha 69.

✓ $\overline{\text{stup}}$  48.

✓ $\overline{\text{stṛi}}$ ; vi—55, 80.

✓ $\overline{\text{stṛih}}$  80.

N. sthag 70.

✓ $\overline{\text{sthal}}$ ; ni—50.

✓ $\overline{\text{sthā}}$ ; ut—41, 42, 56.

pra—51.

sam—60.

N. sthira 71 *bis*.

P. snasta 71.

✓ $\overline{\text{snā}}$  36, 50.

✓ $\overline{\text{spand}}$  53.

N. sparṣa 73.

✓ $\overline{\text{sprīṣ}}$  46 *bis*, 53, 79.

P. sprīṣṭa 66, 67.

✓ $\overline{\text{sphaṭ}}$  53 *bis*.

N. sphata 74.

N. sphara 74.

✓ $\overline{\text{sphal}}$  53.

✓ $\overline{\text{sphīṭ}}$  63.

✓ $\overline{\text{sphīṭṭ}}$  53.

✓ $\overline{\text{sphuṭ}}$  53, 54.

N. sphútkára 73.

✓ $\overline{\text{smi}}$ ; ni—ku—72.

✓ $\overline{\text{smṛi}}$  62; vi—55.

✓ $\overline{\text{syand}}$  61, 63, 66.

N. syanna 66.

✓ $\overline{\text{sraṃs}}$  61.

✓ $\overline{\text{svid}}$  62; pra—51.

ह h.

N. hak 78 *bis*.

N. hakkára 78.

P. hata 78.

N. had 77.

✓ $\overline{\text{han}}$  62.

✓ $\overline{\text{has}}$  63.

✓ $\overline{\text{hā}}$ ; vi—55.

N. hára 78.

✓ $\overline{\text{hu}}$  63.

✓ $\overline{\text{húd}}$  63.

✓ $\overline{\text{hṛi}}$  62; á—42.

anu—42.

pari—51.

vi—55.

vi—ava—56.

sam—60, 61.

✓ $\overline{\text{hṛīṣh}}$  63.

✓ $\overline{\text{hval}}$  63 *bis*.

N. hvala 78.

✓ $\overline{\text{hvṛi}}$  63.

✓ $\overline{\text{hvo}}$  63.

## ERRATA.

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|                                          |                     |
|------------------------------------------|---------------------|
| Page 83, line 22, read <i>budhya</i>     | for <i>budhga</i> . |
| „ 35, „ 38, „ Skr. <i>sak</i>            | „ Skr. <i>sak</i> . |
| „ 44, „ 1, „ खिदु                        | „ खिद.              |
| „ 44, „ 6, „ चोट                         | „ चोट.              |
| „ 47, „ 30, „ भाद                        | „ भाट.              |
| „ 55, „ 17, „ लृ                         | „ ल.                |
| „ 57, „ 19, „ खर्दु                      | „ खर्द.             |
| „ 57, „ 41, „ म्दम्                      | „ म्दु.             |
| „ 59, „ 33, „ लड्                        | „ लड.               |
| „ 59, „ 39, „ लुट, लुल्                  | „ लुट, लुल.         |
| „ 66, „ 30, }<br>32, }<br>34, }<br>35, } | „ Skr. N. „ Skr.    |
| „ 75, „ 13, „ Skr. N.                    | „ Skr.              |
| „ 76, „ 35, „ Skr. N. लुप्               | „ लुप्.             |
| „ 77, „ 28, „ शोभ                        | „ सोभ.              |
| „ 77, „ 37, „ Skr. N.                    | „ Skr.              |
| 78, „ 24, „ Prithiráj                    | „ Prithiraj.        |

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## CORRIGENDA ET ADDENDA.

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Page 1, for Trichinopoli, read Trichinopoly.

„ 2, for stubi (*passim*), read stúbi.

„ 2, line 19, for purána, read púrana.

„ 2, „ 20, (first word) for n read in.

„ 2, „ 5, from bot., for a high, read high.

„ 3, „ 12, from bot., add the following note :—

‘The projecting beam ends are perhaps carved to represent *Yáli* (? Griffins’) heads, and the spiral lumps noticed may be the *Yáli*’s trunk coiled up above.’

Page 4, line 6, from bot., for Nachaiyár, read Náchaiyár.

„ 5, „ 14, after metal add, somewhat like the Sabha (halls) at Chidambaram.

„ 5, „ 8, from bot., insert an asterisk (\*) with foot note :—

On a 2nd visit the former (upper) head appeared to be that of a ram with very curved horns, and its leg and foot cut off and put in its mouth as they still often do at village sacrificial feasts. The buffalo’s head below has its tongue hanging out of its mouth.

Page 6, line 1, after Grám-munsif, insert or village officer.

„ 6, „ 17, after now, insert Jaina.

„ 7, „ 12, for Kasi read Kási.

„ 7, „ 10, from bot., after or, insert Coleroon.

2nd paper p. 8.

Page 8, line 12, for flat silled read flat-silled.

„ 8, „ 5, from bot., for shutter stone read shutter-stone.

„ 9, „ 13, for nehropolis read neeropolis.

„ 9, „ 19, for similar read *kistvaen*.

„ 9, „ 13, from bot., for *chadud* read *chathut*.

„ 9, last line, for Neilipatla read Nellipatla.

„ 10, line 7, for three or four read six or seven.

B. R. BRANFILI,





Fig. 1. Pathán Hut. Kandahar District.



Fig. 2. Pathán Hut Pishin Valley



Fig. 3. An Achakzai Kizhdai or semi-permanent tent. Pishin and Kadaneh Valleys

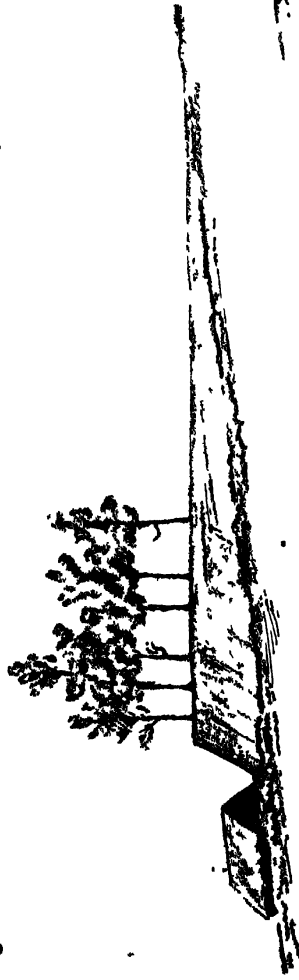


Fig. 4. Ásyá (watermill) with embanked stream Pishin Valley

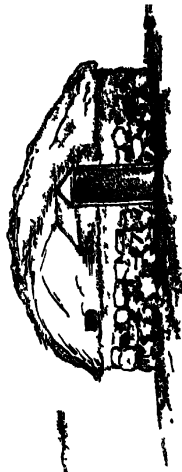


Fig. 5. Kákar Hut. Lower Gorge of the R. Ród (Ísaf Kach.)



Fig. 6. Kákar Hut. Upper Gorge of the R. Ród (Zagan Kach)



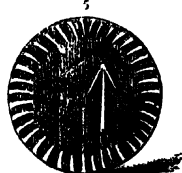
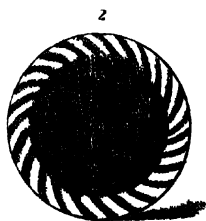
Fig. 7. Mt Syágai, 9,000 feet (a landmark in the Shór Valley, near Chmýán) from Khwára looking East. (No Scale)



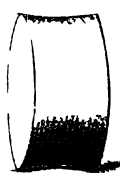
Fig. 8. Zakhbál (Kákar) Hut. Shór Valley. Chmýán.

As photographed at the Surveyor General's Office, Calcutta.





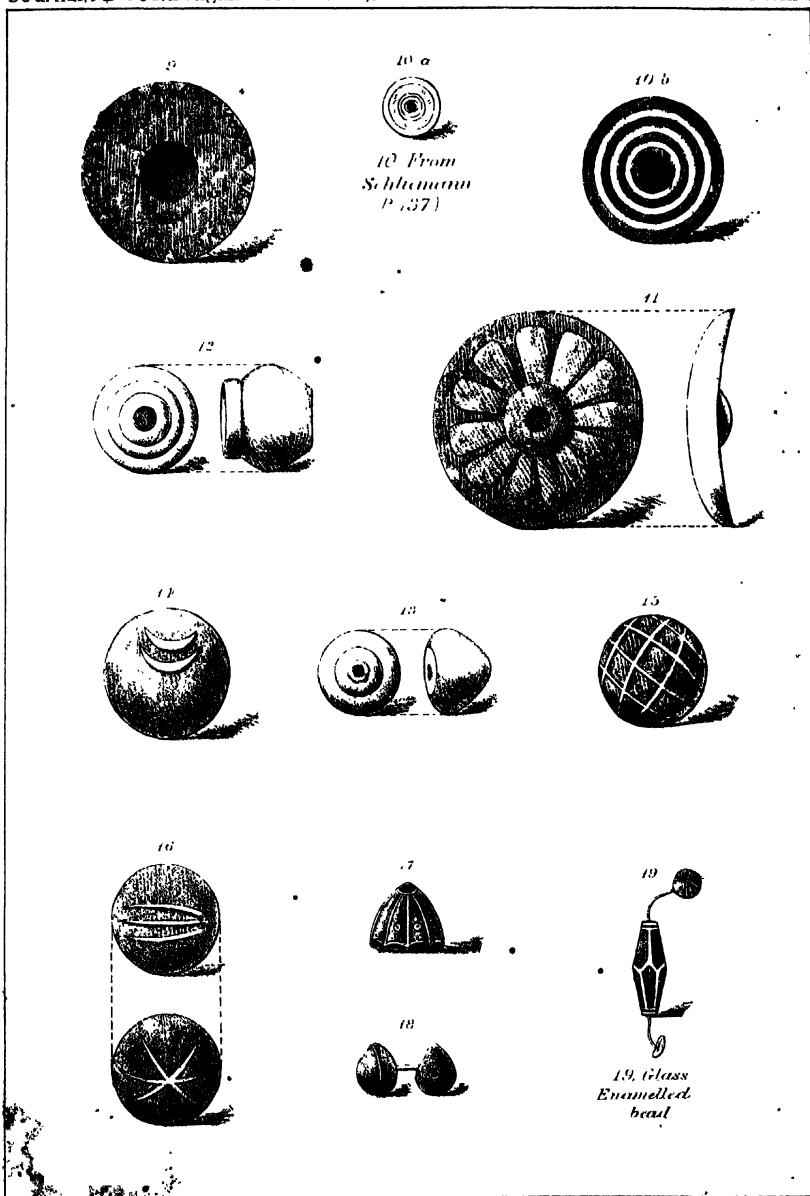
In a Mabastra  
The wheel of the Law



In a Mabastra  
Italian Antiquities  
See Vol 12

SPINDLE WHORLS FOUND AT SANJSA BEHAR  
AND OTHER BUDDHIST RUINS



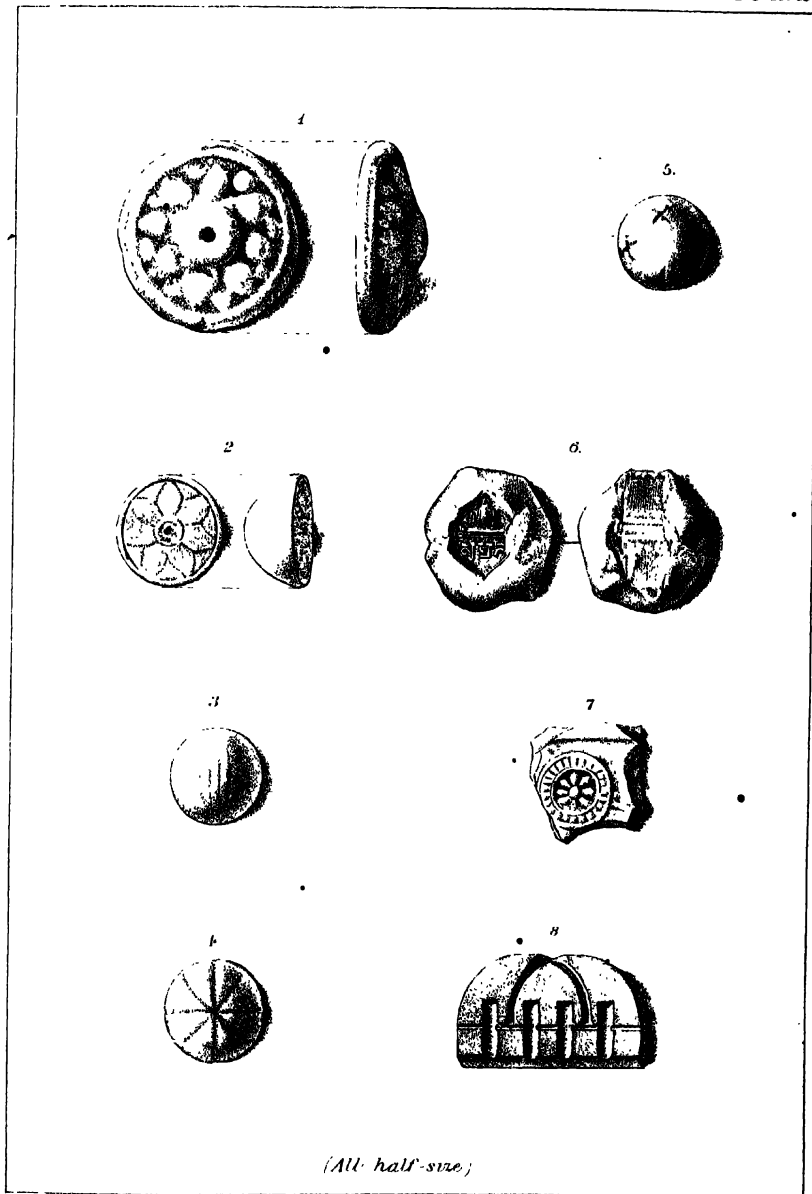


Engraved by J. H. R. from a photograph of the original.

By Rev. H. R. R. - Calcutta.

SPINDLE WHORLS ETC FOUND AT SANKISA BEHAR  
AND OTHER BUDDHIST RUINS.



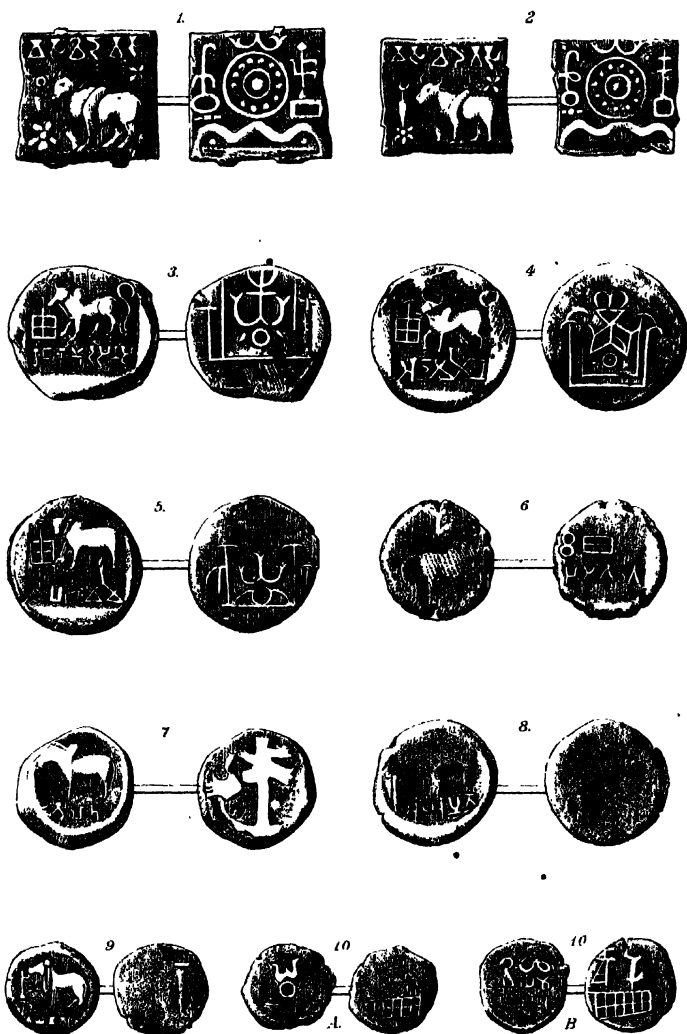


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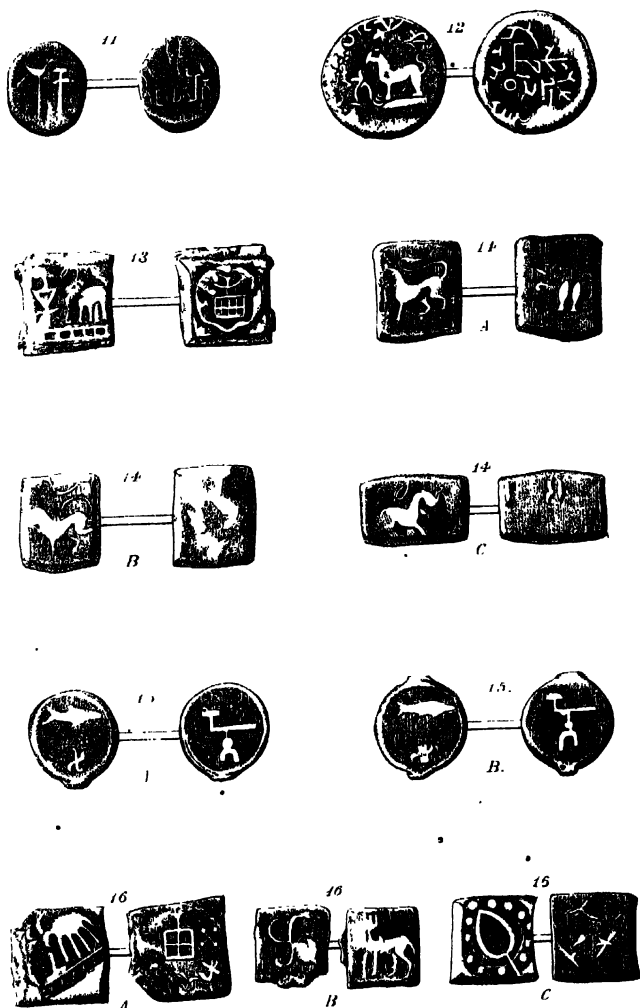
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SPINDLE WHORLS ETC FOUND AT SANKISA BEHAR  
AND OTHER BUDDHIST RUINS.











# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. IV.—1880.

*Remarks on the Afgháns found along the Route of the Tal Chotiali Field Force, in the Spring of 1879.—By* LIEUT. R. C. TEMPLE, B. S. C., F. R. G. S., M. R. A. S. &c. (With 3 Plates and 2 Maps).

(Concluded from page 107)

### PART II.

#### III. *Distribution of the Tribes.*

In the above description of the Tribes along the Tal Chótiáli Route their distribution *en route* has been but briefly referred to. In the next Table the names of the tribes inhabiting the villages on the accompanying map are shown. And it will be seen that as a rule the Paṭhán Tribes and Sections stick pretty well together and are generally to be found in certain compact districts and nowhere else.\* Thus Achakzais are confined to the region about To'BA and the KHO'JA AMBÁN range, and the To'r TARÁNS to the Pishin Valley. Among the Kákar sections the same thing is to be observed. The AMAND KHE'L occupy the country about the north of the Pishin to Mt. KAND and the SULIMÁN KHE'L the range dividing the Pishin and Do'F Valleys, the MENTARZÁIS all the country to the north of the R. Ro'd Gorge and the PÁNÍZÁIS that to the south of it and so on. Even where the country seems to be pretty well divided between sections, as the Do'F

\* Villages of mixed populations are to be found in the more settled parts, such as the Pishin, Do'F, and Gwa'L Valleys, though not commonly, and when it is said that a certain village is occupied by a certain subsection or section it is meant that the majority of the inhabitants belong to it. As a rule, however, villages are not mixed.

Valley and the Ro'd River Gorge, it is divided only among a few, as only Bázais, SHAMOZAIS, SURGARZIS, MALAGAIS, ISA' KHE'LS and SARÁ'NGZAIS amid the surrounding MEHTARZAIS and PANÍZAIS are found in the districts in question. Sayads do not seem to have penetrated into the Kákar country beyond the R. Ro'd, near which there is one village of them, and a few SPÍX TARÍSIS are said to be about ALÍZAI in the Píshin, but practically there seems to be no communication between the SPÍX and the TO'R TARÍSIS. The DUMABs probably occupy all the country to the south of the SHO'B Valley from Mt. MAZHWO to the TAL Valley, but in the ZHO'B Valley the tribes seem to be mixed, though the ZHO'B Valley Kákars seem to be a section apart and to hang together.

| Tribe.  | Division. | Section.  | Subdivision. | Subsection.   | Village.           | District. |
|---------|-----------|-----------|--------------|---------------|--------------------|-----------|
| DURA'NI | ZÍ'RAK    | PO'PAIZAI | ...          | SADOZAI       | PO'PAIZAI          | PÍSHIN.   |
|         |           | BA'RAKZAI | ...          | MOHAMMADZAI   | ASAD KHA'N         | Do.       |
|         | ACHAKZAI  | "         | BAHA'DURZAI  | "             | KHU'SHDIL KHA'N    | Do.       |
|         |           | "         | "            | KA'KOZAI      | MI'RKALAM KHA'N    | Do.       |
|         |           | "         | "            | "             | KA'KOZAI           | Do.       |
| TARI'N  | TO'R      | BADOZAI   | "            | ABDAL         | KALA ABDULLA KHA'N | Do.       |
|         |           |           | "            | "             | TANGAI             | Do.       |
|         |           |           | "            | "             | MADAT              | Do.       |
|         |           |           | "            | HABI'EZAI     | HABI'BUZZA         | Do.       |
|         |           |           | "            | "             | BADWA'N            | Do.       |
|         | TARI'N    | KHA'NIZAI | ...          | ...           | MOHAMMAD SA'DIK    | Do.       |
|         |           |           | ...          | "             | LA'L MOHAMMAD      | Do.       |
|         |           |           | "            | "             | VAKI'L             | Do.       |
|         |           |           | ...          | DAB KHA'NIZAI | DAB KHA'NIZAI      | Do.       |
|         |           |           | ...          | ...           | GAURI              | Do.       |
| TARI'N  | KHA'NIZAI | "         | ...          | ...           | SAYAMZAI           | Do.       |
|         |           |           | ...          | ...           | ALI'ZAI            | Do.       |
|         |           |           | ...          | ...           | ATÁ MOHAMMAD       | Do.       |
|         |           |           | ...          | ...           | SOPANZAI           | Do.       |
|         |           |           | ...          | ...           | NU'EZAI            | Do.       |
| TARI'N  | KHA'NIZAI | "         | ...          | ...           | SKAN               | Do.       |
|         |           |           | ...          | ...           |                    |           |

|                       |            |               |          |
|-----------------------|------------|---------------|----------|
| MA'IN                 | TO'E       | TO'TI         | Do.      |
| TABIN                 | MU'SIZAI   | RAHAMDIL KHAN | Do.      |
| "                     | "          | DADGVAL       | Do.      |
| "                     | "          | NO'A BA'ZA'B  | Do.      |
| MA'LIKIA'B            | "          | MA'LIKIA'B    | Do.      |
| MA'EZAI               | "          | BEJA'N KALA   | Do.      |
| HAIKALZAI             | "          | HAIKALZAI     | Do.      |
| MANZAKAI              | "          | MANZAKAI      | Do.      |
| MA'LIKAI              | "          | MA'LIKAI      | Do.      |
| HA'RU'N               | "          | SIRE' KHILA   | Do.      |
| "                     | "          | SHE'KHA'IZAI  | Do.      |
| KANA'IZAI             | "          | KANA'IZAI     | Do.      |
| SPIN                  | none named | SHINLE'Z      | TAL and  |
| TABIN                 | "          | TAL           | CHOTALI. |
| "                     | "          | CHO'TIA'LI    | Do.      |
| "                     | "          | RAHA          | Do.      |
| "                     | "          | KO'LU         | Do.      |
| "                     | "          | BRAMANZAI     | Do.      |
| "                     | "          | KHVAI         | ZHO'B.   |
| LO'WE' KHWAIDA'IZAI   | "          | GHUNDAMARAI   | Do.      |
| KAKA'B MURSLANGZAI    | "          | HINDU' BA'GH  | Do.      |
| SURGABAI              | "          | WARGHAS       | Do.      |
| MEHTARZAI             | "          | BA'ZA'B       | Do.      |
| MU'SA' KHE'L          | "          | BARSHO'B      | Do.      |
| BA'RAKZAI             | "          | GHURAT        | Mt. KAND |
| none named            | "          | SHARAN        | ZHO'B.   |
| KUCHNAISULIMA'N KHE'L | "          | NABIN         | Do.      |
| KAKAR                 | "          | MURGHAI       | Do.      |
| "                     | "          | HA'JI KHA'N   | PAHIN.   |
| AMAND KHE'L           | "          | KAMIL KHA'N   | TO'BA.   |
| "                     | "          | KHUNCHAGAI    | Mt. KAND |
| MEHTARZAI             | "          |               |          |

| Tribe. | Division. | Section.  | Subdivision. | Subsection.         | Village.          | District |
|--------|-----------|-----------|--------------|---------------------|-------------------|----------|
| K'AR   | MEHTARZAI | MEHTARZAI | ...          | ...                 | MEHTARZAI         | Do.      |
|        |           | "         | ...          | ...                 | BARGAI            | Do'f.    |
|        |           | "         | ...          | ...                 | TLARAI            | Do.      |
|        |           | "         | ...          | ...                 | SADOH             | Do.      |
|        |           | "         | ...          | ...                 | JA'FIE GOT        | GWA'L.   |
|        |           | "         | ...          | ...                 | SRAGHAR           | Ro'd R.  |
|        |           | "         | ...          | ...                 | ZAGAN KACH        | Gorge.   |
|        |           | "         | ...          | ...                 | AMADU'N           | Do.      |
|        |           | PA'NZAI   | ...          | K'DIZAI             | GO'GAI            | Mt. Pyl. |
|        |           | "         | ...          | "                   | RO'DGAI           | Do.      |
|        | BA'ZAI *  | "         | ...          | "                   | SHAMA'WAN         | Do'f.    |
|        |           | "         | ...          | no subsection named | SA'GHAI           | Do.      |
|        |           | "         | ...          | ...                 | BALAZAI KA'RE'Z   | Do.      |
|        |           | "         | ...          | ...                 | KHA'NZAI KA'RE'Z  | Do.      |
|        |           | "         | ...          | ...                 | SHAKAR            | Do.      |
|        |           | "         | ...          | ...                 | GWA'L             | GWA'L.   |
|        |           | "         | ...          | ...                 | MANZAKAI          | Do.      |
|        |           | "         | ...          | ...                 | CHAKU'L           | Do.      |
|        |           | "         | ...          | ...                 | BO'STA'N          | Do.      |
|        |           | "         | ...          | ...                 | WARIA KACH        | Ro'd R.  |
|        | BA'ZAI *  | "         | ...          | ...                 | BAHIMA'N          | Gorge.   |
|        |           | "         | ...          | ...                 | MURGHAI           | Mt. Pyl. |
|        |           | "         | ...          | ...                 | DILSHO'E          | Do'f.    |
|        |           | "         | ...          | ...                 | SAKHA'N KA'RE'Z * | Do.      |
|        |           | "         | ...          | ...                 | NILAI             | GWA'L.   |
|        |           | "         | ...          | ...                 | KARAM             | Do.      |
|        |           | "         | ...          | ...                 | AKHUNDZA'DA GOT   | Do.      |
|        |           | "         | ...          | ...                 | KOSH KACH         | Ro'd R.  |
|        |           | "         | ...          | ...                 |                   | Gorge.   |
|        |           | "         | ...          | ...                 |                   |          |

KA'YAR

" SHAMZAI

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" SURGARAR  
MALAGAI

" Isa' KHÉ'L

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" SARA'NGZAI

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TA'ZI KACH  
LU'N ANGA'NG

KU'Z ANGA'NG

ME'KHA'N

WOCHAKHLA

ISA'F KACH

WARGAI

SHUDAND

KHU'SHLA'K

SHNA'KHOBAL

KUDIN

TLARAI

KA'HAN

KSHOI KA'RE'Z

WULGAI

KHA'NAI

MULA'ZAI

KUDIN

ADAK TANGAI

no subsection named  
ZARGHU'N KA'RE'Z

MOHAMMAD SHARIF

MO'SAI

SNAGA'L

SARA'NGZAI

SPE'ZHANDAI

ZARGHAI

KACH

KWOT

SHE'MIN

Do.

Do'f.

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| Tribe.       | Division. | Section. | Subdivision. | Subsection.         | Village.      | District.  |
|--------------|-----------|----------|--------------|---------------------|---------------|------------|
| KA'KAR       |           | ZAKHPE'L | ...          | NO'AZAI             | BAIA'NAI      | GHAZGAI    |
| "            |           | "        | ...          | ...                 | GHRKHWA'      | Do.        |
| "            |           | "        | ...          | no subsection named | GURMAI        | SHO'R.     |
| "            |           | "        | ...          | ...                 | KURBI         | Do.        |
| "            |           | "        | ...          | ...                 | SA'LA'EH      | Do.        |
| "            |           | "        | ...          | ...                 | CHIMJA'N      | Do.        |
| "            |           | "        | ...          | ...                 | DARGAI        | Do.        |
| "            |           | "        | ...          | ...                 | CHINA'LI      | Do.        |
| DUMAR        |           | "        | ...          | ...                 | RA'DINGZAI    | Do.        |
| "            |           | "        | ...          | ...                 | ...           | MT. SPINS- |
| "            |           | "        | ...          | ...                 | O'BUSHTKAI    | KHAR.      |
| "            |           | "        | ...          | ...                 | SINZAWAI      | SHO'R.     |
| "            |           | "        | ...          | ...                 | SMALAN        | SMALAN.    |
| "            |           | "        | ...          | ...                 | SHAKA'RE'Z    | Do.        |
| "            |           | "        | ...          | ...                 | BAGHA'WA      | Do.        |
| "            |           | "        | ...          | ...                 | NINGA'ND      | Do.        |
| UTMA'N KHE'L |           | "        | ...          | ...                 | ALAM BA'GH    | GHAZGAI.   |
| "            |           | "        | ...          | ...                 | NUMA'RA'      | Do.        |
| "            |           | "        | ...          | ...                 | SARKAI ZANGAL | Do.        |
| "            |           | "        | ...          | ...                 | GHURAT        | Do.        |
| "            |           | "        | ...          | ...                 | BAKHA'        | Do.        |
| "            |           | "        | ...          | ...                 | SAGAR         | ZHO'R.     |
| "            |           | "        | ...          | ...                 | LASHTAI       | BO'RAI.    |
| "            |           | "        | ...          | ...                 | JALKA'RE'Z    | Do.        |
| "            |           | "        | ...          | ...                 | SHAKA'RE'Z    | Do.        |
| "            |           | "        | ...          | ...                 | RO'DLI'N      | Do.        |
| "            |           | "        | ...          | ...                 | ARBASI'N      | Do.        |
| "            |           | "        | ...          | ...                 | KO'T          | Do.        |
| SANDAR KHE'L |           | "        | ...          | ...                 | WARIA'GAI     | Do.        |
| "            |           | "        | ...          | ...                 | KHANKAI       | Do.        |
| "            |           | "        | ...          | ...                 | ZANGIWA'L     | Do.        |

| Ka'kar                  | Sandar Khe'l | ... | Dargai              | Dargai           | Do.   |
|-------------------------|--------------|-----|---------------------|------------------|-------|
| "                       | "            | *   | Shabozai            | Shabozai         | Do.   |
| "                       | "            | "   | Mu'b                | Lo'we' Mu'e      | Do.   |
| "                       | "            | "   | "                   | Kuchnai Mu'e     | Do.   |
| "                       | "            | "   | Waha'b              | Kaun Waha'b      | Do.   |
| "                       | "            | "   | "                   | Lo Waha'b        | Do.   |
| "                       | "            | "   | "                   | Navgiva'la       | Do.   |
| "                       | "            | "   | no subsection named | Di'lai           | Do.   |
| "                       | "            | "   | "                   | Kuzabai          | Do.   |
| "                       | "            | "   | "                   | Tugarai          | Do.   |
| "                       | "            | "   | "                   | Ko'wandai        | Do.   |
| "                       | "            | "   | "                   | Sarka're'z       | Do.   |
| "                       | "            | "   | "                   | Chinai           | Do.   |
| "                       | "            | "   | "                   | Sargharai        | Do.   |
| "                       | "            | "   | "                   | Da'lor           | Do.   |
| "                       | "            | "   | "                   | Kachai           | Do.   |
| "                       | "            | "   | "                   | Kana'            | Do.   |
| "                       | "            | "   | "                   | To'ra            | Do.   |
| "                       | "            | "   | "                   | Cha'gai          | Do.   |
| "                       | "            | "   | "                   | Navgiva'la       | Do.   |
| "                       | "            | "   | "                   | Mu'ltat          | Do.   |
| "                       | "            | "   | "                   | La'ho'b          | Do.   |
| "                       | "            | "   | "                   | Sa'gai           | Do.   |
| "                       | "            | "   | "                   | Sharan           | Do.   |
| "                       | "            | "   | "                   | Sha'ba'n         | Do.   |
| "                       | "            | "   | "                   | Sharan Ka're'z   | Do.   |
| "                       | "            | "   | "                   | Kach             | Do.   |
| "                       | "            | "   | "                   | Sarghar          | Do.   |
| "                       | "            | "   | "                   | Barmikai         | Do.   |
| "                       | "            | "   | "                   | China' Ko't      | Do.   |
| "                       | "            | "   | "                   | Naigwa'l         | Do.   |
| "                       | "            | "   | "                   | Paind Kha'n Ko't | Lu'ni |
| Lu'ni no sections named | Khe'l        | "   | "                   | "                | Lu'ni |

| Tribe. | Division. | Section.   | Subdivision. | Subsection.         | Village.            | District.      |
|--------|-----------|------------|--------------|---------------------|---------------------|----------------|
|        | LU'NI     |            |              |                     | LASHKAR KHA'N       | Do.            |
|        | KHE'L     | none named |              | "                   | LU'NI               | Do.            |
|        |           | "          |              | "                   | NU'R KHA'N          | Do.            |
|        |           | "          |              | "                   | ALAB                | Do.            |
|        |           | "          |              | "                   | SHAUGWA'L           | Do.            |
|        |           | "          |              | "                   | SOBA'T              | Do.            |
|        |           | "          |              | "                   | CHI'NAI             | Do.            |
|        |           | "          |              | "                   | MISRI'              | Do.            |
|        |           | "          |              | "                   | SAMANDAR KHA'N      | Do.            |
|        |           | "          |              | "                   | SARA'GI'            | Do.            |
|        |           | "          |              | "                   | KARBE'LAI           | Do.            |
| ?      | SAYAD     | KARBE'LA   |              | "                   | SHAH DA'D           | PISHIR.        |
|        |           | SAYAD      |              | GANGALZAI           | SAYAD PAIYO         | Do.            |
|        |           | "          |              | BAGARZAI            | SAYAD ALAB          | Do.            |
|        |           | "          |              | "                   | AJABZAI             | Do.            |
|        |           | "          |              | SHADIZAI            | SHADIZAI            | Do.            |
|        |           | "          |              | BAHAMZAI            | SAYAD LA'L          | Do.            |
|        |           | "          |              | "                   | SAYAD KHAMA'NDAI    | Do.            |
|        |           | "          |              | "                   | SAYAD DO'ST MOHAM-  | Do.            |
|        |           | "          |              | "                   | MAD                 | Do.            |
|        |           | "          |              | "                   | HAIDARZAI           | Do.            |
|        |           | "          |              | YASINGZAI           | SAYAD TO'TI         | Do.            |
|        |           | "          |              | "                   | SAYAD SHE'RBAT      | Do.            |
|        |           | "          |              | URUMZAI             | SAYAD SA'LO         | Do.            |
|        |           | "          |              | no subsection named | SAYAD MU'LLA ALLAH. | Do.            |
|        |           | "          |              | "                   | DAD                 | Do.            |
|        |           | "          |              | "                   | SAYAD PAIND         | Do.            |
|        |           | "          |              | "                   | HAI'ZI              | Do.            |
|        |           | "          |              | "                   | TURKHE'L            | Do.            |
|        |           | "          |              | "                   | SHAGHI'N            | Do.            |
|        |           | "          |              | "                   |                     | Ro'd R. Gorge. |

IV. *Polity.*

The portion of Afghánistán along the route may be divided into that formerly subject to the Amír of Kábul, and that acknowledging no superior authority, into, in fact, the Amír's Territory and the country of Independent Tribes. The Amír's power never seems to have extended beyond the Do'f Valley to the eastwards further than ISAF KACH, or further north in that direction than Mt. KAND, i. e., the inhabitants of the ZHO'B Valley and all the country south of it eastwards of the Do'f Valley have never recognised him as their ruler. The tribes then under the Amír's sway were the Durá-nis, the Tór Taríns and such Kákars as inhabited the Do'f and Gwál Valleys, while the bulk of the Kákars, the Lúnis, the Zarkháns and the Spín Taríns have always been independent. For the purposes of this paper the country will be divided into Amír's Territory and YA'GHISTA'N or Independent Territory.

Under the Amír, Government in our sense of the term there was none, though the head of the Government nominally ruled through his Sirdárs or heads of tribes and sections, having, however, little real control over them. And how this system was worked has been thus described.\* "The Sovereign is absolute and makes any and every change which may appear to him necessary or proper in the government and administration. He can dispose of the lives and property of his subjects and is kept within certain bounds in these respects only by the calculations which prudence dictates. Religion is the counterpoise to his authority. This gives the clergy great influence, one that he might try in vain to subject to his will and pleasure, and vainer still would be the attempt to infringe and invade the rights and privileges of the sirdárs or chiefs of tribes, who would never consent to resign a certain influence in the affairs of government. It may be said in Afghánistán that there are as many sovereigns as sirdárs, for each of them governs after his own fashion. They are jealous, turbulent and ambitious, and the sovereign can restrain and keep them in some order only by taking advantage of their rivalry and feuds and opposing one to the other. There is no unity, nothing is permanent, everything depends on the pleasure or caprice of a number of despots always at variance with each other and making their tribes espouse their personal quarrels. A constant feeling of irascibility is the result which finally leads to sanguinary civil wars and throws the country into a state of anarchy and perpetual confusion. The sirdárs are at one and the same time the strength and the curse of the monarch. Prompt to take arms and defend him when a good understanding between them exists, they are as ready to revolt against him when they find or think they have the smallest interest in doing so. In anything,

\* Macgregor's Gazetteer.

however, to which they are disinclined, they would not obey even the sovereign of their choice but with reluctance; moreover they are always impatient to see him replaced by another from whom they hope to obtain greater advantages. Each subdivision of a tribe is, according to its numerical force and extent of territory, commanded by one or more sirdárs. These chiefs may be compared to the dukes and barons of the middle ages in France, the more powerful to the knights bannerets, and those having authority over only a few families to the esquires who in time of war enrol themselves and their men under the orders of the chief that inspires them with the greatest confidence and can pay them best.\* The most powerful amongst them are caressed by the sovereign who attaches them to his interests much more by the concessions he makes than by the fear he inspires. Ordinarily and with a view to preserve a nominal authority over them, he remits the whole of the taxes and imposes in their stead the obligation to furnish a contingent of troops in the event of war being declared against him by his neighbours. This wretched system gives too much power to the Sirdárs. The sovereign is at their mercy, and it is the ambition of these men that gives birth to the numerous civil wars in Afghánistán; for they are constantly in revolt."

Such being the state of civil government in the Amír's Territory, the only difference to be observed in the Independent Territory is, that the local Sirdár, or whatever other local chief happens at the time to be the most powerful, is absolutely uncontrolled even by the semblance of superior power. The above-mentioned independence of the Sirdárs and their impatience of superior control is to be observed in numerous instances even in the Kháns or rulers of villages, being of course more pronounced in YA'GHISTA'N than in the Pishin and other portions of the Amír's Territory. To give an example. In the Pishin the ruins of a village called SAYAD SA'LO or URUMZAI were passed. It had been but recently destroyed by a more powerful neighbouring village called SAYAD PAIND in a quarrel between the two Kháns. The URUMZAI'S had to fly altogether out of Afghán Territory across the Beló'ch Border to KHU'SHILÁ'K where they settled. They appear to have been hunted across the Border by the other village without any attempt at interference on the part of the neighbours. Again not far from this last were two villages, Old and New MA'LIKYA'R, the old village having been deserted on account of an internal dispute and a new site selected a few miles off. The same thing was to be observed at a place called WABIA'GAI in the Bo'RAI valley, where an evidently lately ruined village called Old WABIA'GAI was passed. I was informed it had become so about five years before on account of an internal squabble. Like the

\* The very remarkable parallel to be observed politically between the Afgháns and the Mainotes of Greece I have elsewhere pointed out. J. U. S. I. of India, 1880.

Barons of European feudal times these village Kháns seem to exercise the right of private war on their neighbours without control or interference. Certain villages have acquired an evil name for this kind of truculence. KACH in the SHO'E valley is such a village. Nor is a fight or quarrel always a necessary reason for a change of site, any caprice or change of owners is sufficient. A case in point is the fort of HA'JÍ KHA'N (AMAND KHE'L) in the Pishin. And towards the Border by the HAN Pass, in the long stretch of disputed land about the passes, ruined villages are naturally to be seen in the more exposed parts of the LU'NI KHE'L, ZARKHA'N and SPÍN TARÍN country on the Afghán side and in BA'RKHO'M on the Beloch side, the result of endless border raids. The lawlessness of the GHILZAIS along the roads between Kandahár and Kábul has been noticed by former travellers, one of whom has written : \* "Every man distrusts his neighbour or is at open feud with him. It is the custom of the country to throw a heap of stones over murdered travellers, and in the ravine leading from SHILGAR to ZURMAT (Ghilzai country) the frequency of these heaps is sickening. In many cases they are to be found at the closed end of the ravines showing how the poor travellers have run as far as possible and then been cut down." The same may be remarked of almost any part of the Kákar country, and in that portion about Mts. MA'ZHWÖ and SPINSKHAR where the heights are crossed between the USH and NANGALU'NA Passes, there is a long narrow valley between low hills to be crossed, and in this it is hardly any exaggeration to say that these heaps may be seen but a few yards apart. The reason appears to be that persons going from the SHO'E and BO'RAI Valleys or the DUMAR country from the south towards the Pishin must pass this way through a country which is for some thirty miles utterly uninhabited. In the wild uninhabited border tract about the HAN, HANOKAI and TRÍKH KURAM passes they may be seen in clusters in many places telling of some fights either among the local tribes themselves or with the Belóchis.

The mutual distrust among the tribes and even sections inhabiting different districts is so great as to result in an almost absolute ignorance of each other. They appear to have a real fear of going into each other's country and invariably give one another a bad character. Thus KA'KARS are an abomination to TARÍNS and ACHAKZAIS and LU'NIS to KA'KARS, while the wretched ZARKHA'N is harried on all sides. The ISA' KHE'L Kákars and the inhabitants of the GWA'L valley manifested an extraordinary fear of the PA'NÍZAI Kákars of the hills to the east of them. SANDAR KHE'L Kákars could not be induced to venture into the neighbouring LUNÍ territory and I did not personally meet a man who had been towards GHAZNI by the TO'BA Plateau or along the Tal Chótiáli Route. A guide

\* Macgregor's Gazetteer.

from the DO'F Balley an ISA' KHE'L, showed the liveliest anxiety to get back again from ISPIRA RA'GHA and would not venture into the ZAKHP'L Territory and an old UTMA'N KHE'L guide told me he had never ventured beyond the territories of his section of the Kákars.

The structure of the houses in the more civilized parts, which in the hills consist of nothing more than rough mud and thatch, is a further proof of the general lawlessness of the population. In the GHAZGAI, BO'BAI and LU'NI Valleys, among the UTMA'N, SANDAR and LU'NI KHE'LS a house is nothing less than a fort round which, frequently within walls, is the cultivation necessary to support life, and when the crops are gathered they are stored in little round mud towers which I have shown elsewhere to contain just enough grain for one family for a year. In the DO'F Valley, however, I only saw one fort in a village called KHA'NIZAI KA'RE'Z and in the Pishin the villages were all open. Life in the Pishin among the TABINS and SAYADS seems to have been much more settled than elsewhere, but the ACHAKZAIS have a bad name as thieves and robbers.

Government among the Duránis differs considerably from that of the other tribes, noticeable chiefly in its regularity and order. Each section of the Duránis is governed by a sirdár and each subsection by a MALIK or MUSHIR. The principle is election qualified by hereditary claims, i. e., the sirdár is elected from the chief family of the clan or section, and the malik from the chief family of the subsection. The sirdár has a deputy or naib always a near relative appointed by himself. Their occupation of the land is directly from the Amír on the condition of military service. Among themselves the Duránis do not as a rule resort to private revenge, hence internal blood-feuds do not exist among them as among other tribes. Their disputes are settled by the "JIRGA" backed up by the sirdár, by the interposition of the elders, by friends of the parties, by the priests (MULLAS), or by the civil and ecclesiastical judges (KA'ZI'S). The ACHAKZAIS, the section of the Duránis met with en route, are the wildest of those inhabiting South Afghánistán and are entirely a nomad race, hardly ever living in a house. They inhabit the TO'BA Plateau and during the summer roam over it with their flocks and spread themselves over the lower slopes of the KHO'JA AMRA'N Range about the KADANEI and Pishin Valleys during the winter, where their black tents or KIZHDAIS are to be seen everywhere. Their Sirdár is at present MÍR ASLAM KHA'N, son of MÍR ABDULLA KHA'N who built the well known fort or village of that name at the Pishin entrance of the KHO'JAK Pass.

The Kákars and Independent Patháns do not apparently recognise any particular sirdár or chief, and probably any man rules who has the requisite force of character, though birth, on which an Afghán always sets such an extravagant value, is pretty sure to exercise considerable weight in

the selection of a ruler. Thus SAMANDAR KHA'N of the LU'NIS, now their leader, is the son or near relative of PAIND KHA'N their late ruler. SHA'N JEHA'N of KHASNO'B (ZHO'B valley) is a great man among the KÁKARS and GWARAT KHA'N among the SANDAR KHE'L.

### V. *Civilization.*

As regards civilization, except as to dress, methods of cultivation and dwellings, but little could be observed in such a hurried journey as mine.

On the first point there is little to be noticed beyond what has been already written about it by the authors of the following:\* “The Afgháns wear their clothes long. They consist of two large very ample robes and are either of cotton or a cloth made of camel's hair† called BAREK: this is the dress of the people. The only difference in the garments of the rich is the material, which is silk, cloth or Kashmír. In summer they are made without lining, but in winter they are wadded with cotton or lined with fur. The under-garment is confined by a piece of muslin or long-cloth which is wound round the body. The outside one, and sometimes a third robe, is used as a cloak, and a person would be considered as wanting in politeness if on visiting a superior he did not put it on. The shirt is very full and the sleeves which reach below the hands particularly so.‡ The former is open to the sides from the neck to the waist and falls over the trousers, and these which are excessively large, open at the foot and are drawn in at the waist with a string. The head is covered by an enormous blue or white turban and the feet with slippers without quarters. The upper classes are for the most part simply dressed and consider luxury in this respect as enervating, but some young chiefs have their robes embroidered with gold thread and ornamented with gold lace. This is done in the harems by the women who excel in this kind of work, particularly in Kandahár. The Afgháns are not careful of their clothes and soil them the very first day they are put on, for they squat on the ground without taking the least thought whether the spot on which they sit is clean or dirty. They never change their garments, not even the shirt, until they are completely worn out, and as they rarely wash themselves they are constantly covered with vermin great and small.”

In the matter of dress excepting the Achakzais, the Duránis show as usual a considerable superiority over the other tribes. The following was found to be a fairly true description of their dress.§ “The Duránis about

\* Macgregor's Gazetteer.

† A thick white material like felt for the outer cloak is common about Kandahár and the Pishin, and to this is often added a “póshín” or coat of skin with the hair turned inwards.

‡ The cloaks about Kandahár and all over the South have frequently long false sleeves reaching nearly to the ground.

§ Macgregor's Gazetteer.

towns, most of those in villages and all those of the shepherds who are in easy circumstances wear a dress nearly resembling that of Persia, which though not very convenient is remarkably decorous and with the addition of a beard gives an appearance of gravity and respectability to the lowest of the common people. The poorer Duránis, particularly among the shepherds, wear a wide skirt and mantle. The poor only change their clothes on Fridays and often only every other Friday, but they bathe once a week at least, and their prayers require them to wash their faces, beards and hands and arms many times in the course of the day. The little Kháns all over the country wear the Persian dress. Their coats are made of silk, satin, and a mixture of silk and cotton called GARMSUT, and sometimes of brocade, and they all wear shawl girdles and a shawl round their caps. Their cloaks also are of broadcloth often red or of silk of different colours." To the Achakzais the above remarks hardly apply except in a very general way. Their manner of dress is the same, but they seldom or never change their clothes as long as they last, and consequently go about in filthy rags often half tumbling off them. They are in dress as in everything else the most uncouth and uncivilized of the great clan to which they belong.

With regard to the Sayads, Taríns and Kákars, etc. met with en route there is little to be remarked except that they all wore the unmistakeable Afghán dress. In the more civilized valleys as the Pishin, Dóf, Gwál, Ghazgai and the Bórai the dress was better and more respectable answering to the above given description of the Duráni dress.\* But in the hill districts especially in the elevated region about Mt. MÁZHWO the dress merely appeared to be a collection of dirty rags, the remains of what was originally the national costume. The PÁNÍZAIS, MEHTARZAIS, SARÁNGZAIS, AMAND and SULIMÁN KHE'LS, DUMARS and ZAKHPE'LS among the Kákars bear off the palm for dirt and squalor. The YsÁ, UTMÁN and SANDAR KHE'LS are much cleaner and neater in appearance and altogether better dressed. The LU'NIS and ZARKHÁNS met with wore the dirtier and more ragged class of dress, but with the exception of the SANDAR KHE'L Kákars the Pishin Sayads were the best-dressed people I recollect to have seen on the road.

The dwellings were found to differ considerably in different parts of the route. Those about the Pishin and Dóf valleys were apparently constructed on the same principles, whether Sayad, Tarín, Achakzai or Kákar. Tribe indeed does not apparently affect the construction of dwellings so much as locality.

The most noticeable construction of hut is that to be found every-

\* Among the Sayads it was to be observed that the articles of dress were not homespun but of foreign manufacture, obtained probably during their many visits to Hindustán.

where to the west of the KHO'JA AMRÁN Range. These are square dwellings of mud (*kāchhá*) bricks about 20 feet by 12 feet and some 6 to 8 feet high surmounted by one or more small domes. In this method of construction wood is not required for the roof, a great consideration in a treeless country like South Afghanistan (*vide* fig. 1). But the hut of the Pishin Valley and neighbourhood has a sloped roof (fig. 2) supported on strong rafters, thatched and finally covered with mud. This roof is by far the most valuable part of the structure, and during their numerous migrations they carry away the wood-work to be set up in the new site. The usual measurements of such a hut are roughly: length 18 feet, breadth 6 feet, height of wall 6 feet and of roof 10 feet. They have no windows but usually three small holes at either end for air and smoko. A hut generally stands in a small yard surrounded by a rough stone or mud wall and sometimes there are two or three huts in the same enclosure.

As the mountainous regions between the Pishin and Shor Valleys are approached, the huts become much rougher though constructed on the same principles. They are irregular structures of mud over foundation walls of large unhewn and uncemented stones from the nearest stream or hill-side, and frequently also the back wall is the hill-side itself. The roof as before is of thatch covered with mud. There is also often a small window hole and the door frequently stands out from the roof on the principle of a dormer window (fig. 5). The general dimensions are height 10 to 12 feet, height of rough stone-work 3 feet, of mud wall 1 to 2 feet, length 10 to 12 feet.

Up in the mountains and in the upper gorge of the R. Ro'd the dwellings degenerate into a mere irregular thatch of leaves and brushwood of a pyramidal or conical form supported by a centre pole and having a door or entrance at one side. Frequently a hole is scooped out from the hill-side and thatched in, so as to form a rough kind of hut or dwelling. These conical huts measure generally: height 10 feet, diameter at base 10 feet (*vide* fig. 4).

On reaching the lower lands about O'BUSHTKAI, KIWÁRA and CHIMJÁN, a hut very similar in appearance to that of the lower Ro'd Gorge is to be seen, the roof of which is irregular and of thatch covered with mud and supported on irregular rough stone walls cemented, so to speak, with mud. There is usually no gap for a window (*vide* fig. 8). The measurements are: length about 12 feet, height of wall 3 feet, total height 8 feet.

In the mountainous tract between the SHO'R and ZHO'B valleys the huts are very wretched and have the appearance of being of a temporary character. The floor is scooped out of the ground on the hill-side so as to save a back-wall, and a wall about 3 feet high is built up on three sides

surmounted by the usual mud-and-thatch roof. The interior height is about 6 feet and the length some 10 or 12 feet, breadth 6 feet.

But on reaching the GHAZGAI and BO'RAI Valleys, *i. e.*, the territories of the UTMÁN and SANDAR KHE'L Kákars, a notable difference in dwelling structure is observable. The houses, rather than huts, now to be seen are of mud, as in Belochistán, Sind and the Panjáb.\* In the GHAZGAI Valley they are all fortified after the fashion of these people, having frequently a look-out tower, which is sometimes square but generally circular, attached to them. The body of the building has the sloped thatch-and-mud roof of the Pishin valley. The entrances or doors are very low, being only 3 feet or so in height; the tower has also a separate entrance of a similar construction, and round the top of it is a row of loop-holes. The usual dimensions are: height of wall 4 feet, of hut 8 feet, of tower 12 feet, base of tower 6 feet square (diameter, if round, 6 feet), length of hut 16 feet (*vide* fig. 9).

In the BO'RAI and LU'NI Vallées were the best dwellings (figs. 10, 11, 13) I saw outside Kandahár in all S. Afghánistán, and I can hardly do better regarding them than repeat what I have elsewhere said.† "They are no longer huts, but have become houses with dimensions varying considerably; fig. 10 represents one of the smaller ones. They are built entirely of mud with flat roofs from which the water is carried by projecting spouts. They are generally fortified and have towers attached and usually only one door. Fig. 11 represents one of these fortified houses. The bulk of the houses, however, in the BO'RAI Valley are much larger than those above mentioned, and may be described as fortified structures of mud, surrounded by a mud wall some 12 feet high and covering sometimes nearly an acre of ground (*vide* fig. 13). They have usually several towers attached and one door; within the outer wall are a quantity of fruit trees, and the house probably contains a whole family. Generally also there is a low 3 foot mud wall extending round the fields belonging to the house probably for their protection. Three or four such houses often constitute a village. The fortifications of an UTMÁN KHE'L village are often supplemented by a small regular square mud fort or redoubt with corner towers. Forts of a similar description are also to be observed about the SANDAR KHE'L and LU'NI Territory, where the villages are generally a straggling collection of

\* In the Panjáb the walls of such a house (*kachchá makán*) are built simply of wet mud (*gónghá*) without foundation (*bunyád*), then smoothed over with liquid mud (*kaigal*) and finally covered with a wash of cowdung and mud (*góbri*) and often also with whitewash (*sufédí*) or a coloured lime-wash (*rang*). The roof (*chhat*) is of rafters (*kharí*) covered with a light reed thatch (*sirkí*), plastered over with mud or earth (*mittí*) and cowdung (*góbri*).

† J. R. G. S., 1880.

the large fortified houses above described. They have a well-built, substantial and prosperous appearance not often seen in the East. Sometimes a MALIK or petty chief will build himself a fort apparently as much for show as anything else. CHINÁ KO'T in the BO'RAI valley (fig. 14) is such a fort. The main interest in it is that it is quite new, not more than 20 years old, and so is a specimen of the modern method of KÁKAR fortification. It is on a small isolated hillock rising out of the valley, and is constructed as usual of mud on a rough stone foundation. The owner is one MALIK SANDÍ, an ALÍZAI SANDAR KHE'L. The approach is by a causeway of very rough construction, and it is entered as usual by a single door so situated as to be easily commanded. The whole structure covers about an acre of ground".

The nomadic habits of the DURÁNIS and especially of the Achakzai section of that tribe have been frequently noticed by former writers. Among the KÁKARS, too, are found several nomad sections, such as the SULIMÁN and AMAND KHE'LS of the Pishin and the bulk of the PÁNÍZAIS, DUMARS, and ZAKHPELS; even the more fixed and agricultural sections of the KÁKARS, as the SANDAR and UTMÁN KHE'LS, and the LU'NIS have the nomadic instinct strong in them and spend all the hotter weather roaming with their flocks in the neighbouring hills. By far the greater part of the ACHAKZAIS have no fixed abode, but live in a curious kind of hut called a KIZIDAI, which has been thought peculiar to the DURÁNIS, but as far as I could ascertain, it is common to all the nomad sections whether DURÁNI or KÁKAR. The KIZIDAI is a structure of bent willow rods or withies covered over with black felt-like blankets and sometimes with black matting (*vide* fig. 3). There are generally four or five of these willow supports in a row over which the covering is stretched. I saw one in the course of construction near ALÍZAI in the Pishin and the method of putting up the supports is that shown in fig. 15. The Kizhdais are very warm in winter and can be made, by opening out the sides, cool and pleasant in summer, and are also, from the closeness of the strands of the covering which swell with moisture, impervious to rain. They have for a nomad race the advantage of being as easily moved as an ordinary tent. In several Kizhdais of a permanent kind near villages I saw a regularly railed in space in the middle for goats and sheep. The usual dimensions are: height 4 feet, length 12 feet, opening or doorway 3 feet by 3 feet.

There are two other kinds of structure which are interesting in this connection. In the BO'RAI valley the SANDAR KHE'LS build small circular mud towers of peculiar make (*vide* fig. 12), raised on piles about 2 feet from the ground, in which they store grain containing as I have elsewhere shown\* about enough for five persons for one year. BIUSA (chaff or chop-

\* J. R. G. S., 1880.

ped straw for fodder) is kept in round mud-covered heaps containing about 100 to 200 maunds, as are turnips etc. in England for the winter. Grain of all sorts is also stored in sacks weighing about 100 seers, which are kept in the huts and sometimes buried in some place known only to the owner to save them from the rapacity of the numerous hangers-on of the Sirdárs or of the Amír.

Secondly, *ĀSYĀS* or watermills are noticeable objects everywhere. Their general features have been frequently before described, as they are common to Afghánistán, Persia and Turkistán, and the following from MacGregor will answer the internal description of them all: "The wheel is horizontal and the feathers are disposed obliquely so as to resemble the wheel of a smoke-jack. It is within the mill and immediately below the mill-stone, which turns on the same spindle with the wheel. The water is introduced into the mill by a trough so as to fall on the wheel. The wheel itself is not more than 4 feet in diameter."\* Externally they have always the appearance of the ordinary habitations round them, whatever the prevailing construction may be. They are to be found along the line of a *KU'L* or of a natural running stream, and often, to give the water greater power, a portion of the stream will be banked up for some distance before it reaches the mill (fig. 4). The roof is usually on a level with the banks of the stream. In places, as at *ĀLÍZAI* in the Pishin, long lines of *ĀSYĀS* and embankments are to be seen along the same stream (fig. 17).

There is little to be remarked under the head of cultivation beyond a notice of such methods of irrigation, etc., as came prominently under observation, for my journey was of too hurried a nature to admit of any investigation. In irrigation considerable skill is everywhere evinced in S. Afghánistán, especially in the direction of *KU'LS* or artificial water-courses, of *KĀRE'ZES* or underground water-courses, and of groins and river dams. Wells are not seemingly in use for cultivation as in the Panjáb and Persia. The *KU'L* is well-known in all the northern districts of India and there is little to be added here, except to notice the general prevalence of this style of irrigation in S. Afghánistán, where along the *TARNAK* Valley it is used to such an extent as to dry up and disperse the water of the river: a state of things also noticeable along the rivers running towards the Indus and the *KACHÍ* Plain of Belúchistán. The entire flow of many mountain streams is frequently thus utilised, and great skill is often to be observed in the preservation of the levels; and in one place in the *BO'RAI* Valley I observed a *KU'L* carried under the stony bed of the *R. TO'RA KHAIZE'* by a rough but practicable syphon.

\* Such watermills are common enough in the Himalayan districts, and I have in my possession a wooden bowl turned by a lathe worked by a water-wheel in a remote valley in *Ku'lu'*.

The KÁRE'Z has been frequently noticed by travellers in Central Asia beginning with Marco Polo, who, according to Ramusio's version, writes about "the wearisome and desert road in KERMÁN (KIRMÁN)", that\* "after those days of desert you arrive at a stream of fresh water running underground, but along which there are holes broken in here and there, perhaps undermined by the stream, at which you can get sight of it. It has an abundant supply and travellers worn with the hardships of the desert here rest and refresh themselves and their hearts." Col. Yule remarks on this (p. 116) "the underground stream was probably a subterranean canal (called KANÁT and KÁRE'Z) such as is common in Persia, often conducted from a great distance. Here it may have been a relic of abandoned cultivation". Khanikoff on the road between KIRMÁN and YEZD, not far west of that which I suppose Marco to be travelling, says: "At the fifteen inhabited spots marked on the map they have water which has been brought from a great distance and at considerable cost by means of subterranean galleries to which you descend by large and deep wells. Although the water flows at some depth its course is marked upon the surface by a line of more abundant vegetation." Elphinstone says he has heard of such subterranean conduits 36 miles in length" MacGregor describes the construction of a KÁRE'Z thus: "a shaft 5 or 6 feet in depth is sunk at the spot where the stream is to issue on the surface, and at regular intervals of from 20 to 50 or more paces in the direction of the hill, whence it has been previously ascertained that a supply of water will be obtained, other shafts are sunk and the bottoms of all connected together by slightly sloping tunnels. The depth of the shafts increases with their distance from the original according to the slope of the ground. Their number and the length of the KÁRE'Z depends on the supply of water met with, the quantity required and the distance of the habitable or cultivable spot. The position of the shafts is marked by circular heaps of earth on the surface and their orifices are usually closed, the covering being removed at intervals of a year or more for the purpose of cleaning and repairing the shafts and tunnels. Much experience is required to select a spot from which a plentiful and lasting supply will be obtained. Some KÁRE'ZES afford a constant supply of water for ages whilst others become exhausted before they have paid for the cost of construction." To this I may add the advantage of the KÁRE'Z is the prevention of the rapid evaporation the water would undergo in such a climate if freely exposed to the air. KÁRE'ZES are frequently very deep, 40 feet and more below the surface. Judging from one seen under construction in the Pishin, the shafts or wells are sunk as usual with pick and shovel and with crate and windlass, and the water-passage tunnelled out afterwards. One cause of the per-

\* Yule's Marco Polo I, 115.

manent drying up of KÁREZES is the shifting of the subterranean water lodgment, and it is not uncommon to see parallel lines of KÁREZ wells close to each other. KÁREZ digging is a special occupation, the GHILZAIS being famous for it.

The system of irrigation by tanks or open reservoirs so successfully used in MAISUR and many parts of the Madras Presidency is only sparingly used in Afghánistán, and I only observed a few small irrigation tanks in the Pishin and KADANEI Valleys, though from the universal presence of uneven country in Afghánistán it would appear that the MAISUR system of *bands* and tanks should succeed as a means of irrigation if regularly introduced.

The method of irrigation by means of groins and reclamation of river-beds to be observed in the high lands along the valley of the R. Ro'd and in the SHO'R Valley in the neighbourhood of CHIMJÁN is very remarkable. These groins are constructed at a great cost of labour with rough stones and tree trunks and are frequently turfed over and planted with willows and small bushes. In the Ro'd Gorge the main portion of the cultivable land has been obtained in this way.

There is one more point to be noticed in this connection. Elphinstone states (Kingdom of Kábul) that it seems to be only in the very poorest parts of the country that land is allowed to lie fallow for a year. This, however, is apparently not the case in the KÁKAR Country generally, especially in the BO'RÁI Valley, where the large area under cultivation is only to be accounted for by a large portion of it being allowed to lie fallow every year.

Madder, which, as MacGregor observes, is common in the west of Afghánistán and sold all over India by Patháns as MAJÍR or MANJÍR, is to be found in the DO'R Valley in highly cultivated lands deeply furrowed and manured. The leaves are used for cattle and the roots for the dye. This cultivation is elaborate, good and costly, and the yield in the DO'R Valley is said to be worth Rs. 1000. The people there believe apparently that it is not grown elsewhere; it is, however, to be seen about TAKHT-I-PU'L near Kandahár.

Graveyards deserve mention in this place. These are to be found scattered over the land in places quite remote from population. In fact the dead are frequently carried to long distances from their place of decease in order to be buried at a particular spot. This system of carrying the dead to certain places belonging to the family is prevalent among the Panjáb Muhammadans, the YU'SUFZAIS and other such Patháns as inhabit British Territory. I saw the body of a SUBAHDÁR of the 26th Panjáb Native Infantry who had died at Quetta being carried down the Bolán Pass to be buried in the Pesháwar District, and on the Panjáb Railways

there are special rates and arrangements for the carriage of corpses. On the other hand among the Pathāns travellers and often the dead on a field of battle are buried where they die, and the GHILZAIS are always so buried. The reason given for conveying corpses to certain burial grounds is, that a Pathān should be buried by the tomb of the Pīr or Saint he followed in life, at whatever distance it may be. This accounts for graveyards on the summits of mountains, as on Mt. KHWAJA AMRĀN in the GWĀJA Pass, and in the TRĪKH KURAM and PĀLKAI Passes miles away from habitations.\* I was told that parties on the road to and from a burial place were never molested. MacGregor† states with reference to the GHILZAIS that it is the custom of the country to throw a heap of stones over a murdered traveller and that the road leading from SHILGHAR to ZU'EMAT the frequency of these heaps is sickening, in many cases being found at the closed ends of ravines, showing that the poor travellers have run as far as possible and then been hewed down. The same remarks would be perfectly true of the long and narrow TO'POBARGH Valley near Mt. MÁZIWŌ in the highlands separating the country of the ZAKHPE'LS and PĀNÍZĀIS, a place particularly favourable for such murders, and the large number of such heaps as above described, sometimes three or four together, is horrible to contemplate. This method of forming cairns is common also in the Himalayan Districts, and I have seen GURKHĀS in passing these Pathān cairns throw stones on them from sheer habit.

The LU'NIS form little pillars of rough stones to mark the spots of victories over the Belúchis, and several such pillars (fig. 16) are to be found in the HAN Pass and about the Debatable Lands.

As might have been anticipated, of historical remains there are practically none. Indeed such could hardly be expected in a country which has no history to speak of, beyond petty internal squabbling, and no means of constructing buildings on any scale or of durable materials. In the Pishin there is an old ruined fort of the HĀRU'NS (TARĪNS) on a hill called SIRE' KHILA deserted about 60 years ago; and near SAMĀLZAI, not far from KHU'SHDIL KHĀN, a small artificial mound with some fortifications on it like those at Quetta, with which it has probably a similar origin. It is called SPĪN KHILA (White Fort) but has apparently no local history. The only distinctly historical traditions which the Kákars appear to have relate to NĀDIR SHĀH's time, i. e., only a century back, and in the BO'RAI all

\* The ZAKKA KHE'LS, a wild troublesome tribe about the KHATIRAN, who have a bad name, are said to have stolen a saint from the YU'SUFZĀIS and murdered him to obtain the Pīr's round whose grave they bury their dead. Tradition says that they are such scoundrels, that no man among them could be found whom even they could reverence after death as a saint.

† Quoted above in the section on Polity.

remains are locally referred to him. In the centre of the Valley a fort of some size built on the same principle as that at Quetta, but not so high and much more extensive, is called SHAIKH-I-NÁDIR. It is now deserted and considerably ruined. The principle on which these forts were built is a very sound one in such a country, as the most desirable position from which to watch a valley is from an eminence so situated that all parts of the valley are visible at once, and at the same time that an enemy advancing from the hills must show himself. As it is very seldom that such eminences are natural they had to be constructed where necessary. This is the governing principle in the selection of the sites of Quetta and Kandahár, in fact the attempt to build Kandahár alongside one of the apparently strongly situated hills near it failed as a military measure.

In the BO'RÁI Valley and along the route thence, *viâ* the HANUMBÁR, TRÁKH KURAM and HAN Passes, towards BÁRKHO'M a remarkable set of remains are found everywhere in the shape of large quantities of pieces of burnt bricks and pottery\* of a manufacture and excellence not now known in these parts. These are found in all kinds of places, on the hill tops, in the valleys and passes and alongside streams. The inhabitants say they are the remains of NÁDIR SHÁH's army, but as this was an old KÁFILA route, the present one *viâ* MEKHTAR being not far distant, it is as likely that the presence of the remains is due to this as to NÁDIR SHÁH's march in this direction; it is, however, more than likely that he and his successor AHMAD SHÁH, the first DURÁNI and hero of PÁNÍPAT, or portions of their forces made more than one march along this route.

The state of civilization varies considerably with the locality, the inhabitants of the valleys being of course more civilized than their hill neighbours. As has been above observed, the more hilly the country the more scarce and rough the dwellings become, a sure indication of the general civilization of the occupants. The ZARKHÁNS and among the KÁKARS the DUMARS, ZAKHÉ'LS, PÁNÍZATS and AMAND KHE'LS bear off the palm for wildness, and their civilization is merely nominal. The UTMÁN and SANDAR KHE'LS present a substantial, though rude, form of civilization of the patriarchal type, as shown in their buildings, their husbandry, their better class of wearing apparel and the quantity of food supply, much of it foreign, which they possess, and the same is true of the LU'NI KHE'LS. The Kákars of the DO'F and GWÁL Valleys resemble their Pishin neighbours in almost everything, even to their habit of visiting foreign countries, and many an ISÁ KHE'EL or SHAMOZAI Kákár is to be found, who has been in Karáchi and Bombay and even served as a sailor. In the Pishin there are many indications of a superior civilization, notably in the presence of

\* Several specimens were sent to this Society by the present writer with the Geological collection he made in the districts under discussion.

women and children in the villages passed by the army, the knowledge of Hindústānī, which is there so frequent as to carry one anywhere through the valley, and the travelling habits of the people. These traits are more specially to be observed among the Pishin SAYADS, than among the TARINS, though many of these speak Hindústānī fluently, as also can some of the DO'F and GWÁL Valley KÁKARS. Many of the so-called Patháns who travel to all parts of India and even to Burmah selling horses are Pishin Sayads, some of whom make it a yearly practice to do so, keeping regular agents at BANGALU'B (in MATSU'R) and other horse marts. When the field telegraph was first opened at GULISTÁN KÁREZ in the Pishin, all private messages had to be countersigned by the Political Agent, whose tent was besieged by applications for telegrams from the Sayads and Taríns, who sent messages to all parts of India, one being addressed to Kandy in Ceylon.

## VI. *Language.*

My observations under this head were the most unsatisfactory of all, as I was enabled to do little more than observe the variations in the pronunciation of place names.

The language spoken is PUSHTO\* in dialects not, however, differing so much from the standard Pushto of our army as to prevent the soldiers from being readily understood. Its most prominent feature, the excessive gutturalness, seen in such words as GHWAZIH, UKHMUGHDAI, ZHIZIA TANGAI, is apparently such as is commonly to be found in the language, as also are the harsh cerebral *t*, *q* and *r*, so frequently heard all along the route.†

The next most important feature for the purposes of this paper is the interchange of consonants in place names. Those that came under observation are the following, some of which are doubtless due to local dialectic variation.‡

### *Changes of J.*

into *d* and *z*. NGÁNDEH = NGÁNJEH: SYÁJGAI = SYÁDGAI = SÁZDAI.

into *zh* and *y*. ZHO'B = JO'B = YO'B.

into *z*. ZAI (the termination) = ZO'I = JAI = JÍ.

into *sh*. KHÚSHLÁK = KHUJLÁK.

\* Or PUKHTO. KH (خ) and SH (ش) are convertible sounds in the language.

† This is especially the case in the BO'RAT Valley and in the country approaching the Belóch Border. But this might be due to the propinquity of the Belóchhi dialects in which *t* and *q* are very hard.

‡ All such interchanges are valuable for comparing and identifying the names given by various authors to places along the same route.

*into ch.* KHUNCHAGAI = KHUNJAGAI.

*Changes of Z.*

*into d.* DARGAI = ZARGAI : MANZAKAI = MUNDAKAI : SANDAR

KHE'L = SANZAR KHE'L,

*into d.* TO'R KHAIZE' = TO'E KHAIDE'.

*into zh.* ZAWAR = ZHAWAR : ZADÚN = ZHADÚN.

*into g.* MULÁZAI = MALAGAI.

*Changes of R and Ṛ.*

*r into ṛ.* BO'RAI = BO'RAI : WARIÁGAI = WARIÁGAI.

*r and ṛ into l.* MÚLTAT = MURTAT : KALA = KIRE' = KILE' :

SHNAGÁL = SHNAGHAR = SHNAGHÁL.

*r into d.* KHWÁRA = KHWÁPA.

*r into zh.* KIZHDAI = KIRDAI.

*Changes of D.*

*into g.* ANGÁND = NGÁNG = NIGÁND : SYÁJGAI = SYÁJDai.

*Changes of G.*

*into k.* KO'T = GO'T.

*into gh.* SHNAGÁL = SHNAGHÁL : GHWAND = GUND : GHUNDAMARAI  
= GUNDAMARAI.

*into kh.* GWÁJA = KHWÁJA.

*Changes of KH.*

*into k.* KSHO'I KÁRE'Z = KUSHO'I KÁRE'Z.

*into gh.* IGHARG = IKHARG.

*Changes of F.*

*into v and b.* YSAF = YSAB = YSAV.

*Changes of B.*

*into p.* ALAB = ALIP.

*Changes of S.*

*into sh.* LASTAI = LASHTAI.

*Changes of TS.*

*into ch.* TSAMAULANG = CHAMÁLANG.

*Changes of V.*

*into w.* VATA'KEI = WATA'KARI.

Instances of the loss and addition of consonants are :

*of G.* PLA'NGZHARA = PLA'NZHARA.

*of D and G.* ANGA'ND = NIGA'N = NGA'NG.\*

*of R.* DUMAR = DUMA' : BAGHA'WA = BAGHAWAR.

*of K.* LASHTAI = LASHTKAI.

And instances of the transposition of syllables and consonants are :

*of R.* SURGHWAND = SBAGHA'ND.

*of Gh.* GHOBARGAI = OGHARGAI : ZAGHLÚN = GHAZLÚN.

*of N.* ANGA'ND = NIGA'ND = INGA'ND.

From the above examples it will be observed that the most unstable consonants are J, Z, ZH, R, D, G, KH, F, B, S, TS, and V, with their counterparts SH, CH, ZH, K, GH, B, and W.

Regarding consonantal interchanges peculiar to the Pushto language, Raverty (Gram. Pushto, p. 3) has noticed that kh (خ) is changed into sh (ش), g (گ) into zh (ژ), ts and dz into ch and j. And of the KHAI-BARIS he observes that they so transpose their letters as to be almost unintelligible. In his Dict. of Pushto (xxii) he further notices the interchange of z into dz.

Of vowel sounds I noticed as peculiar an o pronounced in several words as the close German ö, thus, UZHÖ, MA'ZIIWÖ. And also the common termination ai (written by Raverty aey) which is sounded with a closed mouth and sharply as one syllable, though it partakes of the nature of two; thus, ai. The frequent recurrence of this last gives the language an uncouth sound, and, coupled with the prevalence of guttural consonants, an unpleasant harshness to English ears.

The vowel changes are not important, the following being the most noticeable.

*Changes of A and A'.*

*a into i.* ANGÁND = INGÁND: KAZHDÁI = KIZHDÁI: KALA = KILE' = KIRE': TSAMAULANG = CHIMÁLANG: ALAB = ALIP.

*a into u.* MULÁZAI = MALAGAI: MANZAKAI = MUNDAKAI.

*a and á into au.* TSAMAULANG = CHIMALANG = CHIMÁLANG.

*Changes of AI.*

*into i and o'i.* ZAI = ZO'I = ZÍ: LÁKAI = LÁKÍ: BO'RAI = BO'RÍ: LÚNAI = LÚNÍ: DARGAI = DARGÍ.

*into a.* MANGAL = MAINGAL.

*Changes of U.*

*into o.* LÚNAI = LO'NAI.

*Changes of I.*

*into e.* ISAF = E'SAF.

*Changes of WA.*

*into au.* WARÁ = AURÁ.

*into u and au.* GHIWAND = GUND: WARÍAGAI = URÍAGAI = AURÍAGAI.

*into á.* SURGHIWAND = SURGHÁN.

*into o.* BAGIRÁWA = BAGHÁO.

Among local peculiarities a tendency to shorten and nasalize long vowel syllables was frequently to be noticed, thus—

AMANDÚN for AMADÚN: ADINZAI for ADIZAI: BÁNZAI for BÁZAI: AJJÍ KHÁN for HA'JÍ KHÁN: HANUMBAR = ANUBAR: ANGÁND and NINGÁND =

NIGA'N: BAHGA'WA = BAGHAWAR: and numerous other instances could be adduced.

The Persian silent w Raverty (Gram. Pushto 4) observes is always sounded in Pushto; thus خواب is pronounced KHWA'B, not KHA'B, خوان; is KHWA'N, not KHA'N. My observations in Kákar-land did not quite bear him out in this; for the following I found to be synonymous pronunciations. AKHUND and AKHWAND: ZARKHA'N and ZWARKHA'N: SURKHWA'B and SURKHA'B, (where the w is a gratuitous insertion, the word being SURKH + A'B, red water): SURGHWAND and SURGHIA'N.

Before leaving the vowels a curious insertion of y in the following word is worthy of remark. CHO'TIA'LI is locally CHO'TA'LA'I: ZAKHPE'L and ZAKHPE'Y'L are synonymous and so are SYA'JGAI and SA'ZGAL.

The following is a list of the various forms under which place names were found by myself and on which the foregoing observations are based.

1. ANGA'ND \* = NGA'NJEH, NIGA'NJEH, NIGA'N, INGAN, NINGA'N, NGA'NG, NIGA'ND, ANGAND, NGA'NDEH.\*
2. MUZARAI = MZARAI.
3. AJJÍ KHA'N = HA'JÍ KHA'N.
4. GWA'JA = KHWA'JA.
5. SKAN = ISKAN.
6. ZAI = JAI, JÍ, ZO'Í.†
7. ZHO'B = JO'B, YO'B.
8. ISAF KACH = ISAB KACH, E'SAB KACH, E'SAF KACH, YÚSUF KACH.‡
9. KHARZANGAI = KHABARZANGAI.
10. ALLA'IDA'D = KHA'LAKDA'D.§
11. KHÚSHLA'K = KHUJLA'K.
12. KIZHDAI = KIRDAI, KAZHDAI, KIZHDÍ.||
13. KALA = KILE', KIRE', KO'R.||
14. SURKHWA'B = SURKHA'B.
15. KHUNCHAGAI = KHUNJAGAI.
16. GO'T = KO'T,||
17. KHSHO'Í KA'RE'Z = KSHO'Í KA'RE'Z.

\* JEH is for DEH, a village. These words represent the Lóh Anóáng and Anóáng of the map (Do'f Valley).

† To show pronunciations of ai: this is a termination not a word.

‡ These names arise from the confusion between Isav and Yúsuf (Esan and Joseph).

§ These words have the same meaning, viz. God-given: there is a similarly named village near Kandahár.

|| These are not place names.

18. ZHAWAR = ZAWAR.
19. IGHBARG = IKHBARG.
20. AMADÚN = AMANDÚN.
21. ADIZAI = ADINZAI.
22. ZADÚN = ZHADÚN.
23. MANGAL = MAINGAL.
24. BA'ZAI = BA'NZAI.
25. SURGHWAND = SURGHA'N, SURGHA'ND, SBAGHA'ND, SURGHAN,  
SURGHAND, SBAGHAND.
26. SHNAGA'L = SHNAGHAR, SHNAGHAL, SHNAGAI, SHNA' KHORAI.
27. WARÍÁ KACH = AURÍÁ KACH.
28. WARGAI = BARGAI.
29. MULA'ZAI = MALAGAI.
30. ZAKHPE'L = ZAKHPE'YEL = ZAKHWAI.
31. GHOBARGAI = OGHBARGAI.
32. DUMAR = DUMA'.
33. SYA'JGAI = SYA'DGÍ, SYA'DGAI, SA'ZAI, SYA'JDAL, SAZDAL.
34. KHWA'RA = KHWA'PA, KHWA'R.
35. ZAGHLÚN = GHAZLA'NA, GHAZLÚN.
36. DARGAI = ZARGAI, DARGÍ.
37. GHUNDAMARAI = GUNDAMARAI.
38. GHWAND = GUND.
39. PLA'NZHARA = PLA'NGZHARA.
40. SURMASTAILI = SURMASTA'LI.
41. BATA'NAI = BIA'NÍ.
42. SANDAR KHE'L = SANZAR KHE'L.
43. TO'R KHAIZE' = TO'R KHAIDE'.
44. CHO'TIA'LI = CHO'TA'LAI.
45. BO'RI = BO'RAI, BO'RAI.
46. LASHTAI = LASTAI, LASHTKAI.
47. WARI'GAI = WARÍÁ'GAI, URI'GAI, AURIA'GAI.
48. HANUMBA'R = ANUBA'R, ANUMBA'R, HANUBA'R.
49. MÚLTAT = MURTAT.
50. LÚNI = LO'NAI, LÚNAI.
51. LA'KAI = LA'KÍ.
52. TSAMAULANG = CHIMALANG, CHAMALANG, CHAMAULANG, CHA-  
MA'LANG, CHA'MALANG.
53. ALAB = ALIP.
54. SOBA'H = SOBA'T.
55. BAGHA'WA = BAGHA'O, BAGHAWWA'R.
56. VATA'KBI = WATA'KABI.
57. ZARKHA'N = ZWARKHÁN.

58. TO'R TSAPPAR = TO'R TSUPPRÍ.\*

59. PASTE' = PASTO'.

60. MANZAKAI = MUNDAKAI.

The frequent recurrence of certain names on the map leads to the supposition that many of them are merely descriptive and on examination the meanings of a great portion become apparent, the descriptive words having changed very little on becoming names of places.† And though it is always treading on dangerous ground to give derivations of place names, I think the following are worth hazarding:

1. TANGAI means a gorge or pass, so SPÍR TANGAI would be the White Gorge (SPÍR for SPÍN) and TÚR TANGAI the Black Gorge (TÚR for TO'R.)

2. GHUNP is round, globular and the GHUND Peak would mean the Round Hill, and Mt. SURGHWAND the Red Round Hill. Again GHUNPA is a detached hill and GHUNDAMARAI is Adam's apple in the throat, and as applied to a village would mean the village by the round detached hill.

3. LWA'RA means hilly and as applied to a valley would signify the hilly or upland valley.

4. CHOR means a ravine or water furrow and is applied to a steep-banked stream in the Pishin.

5. SIRE' KHILA would be the Inn or Caravanserai Fort. It was the old rendezvous of the HÁRÚN TARÍNS in the Pishin. This is probably also the meaning of ZARA KHILA in the Pishin.

6. The GAZ-Hills might mean the Long Hills from گز a yard-measure or the Tamarisk Hills from غز a tamarisk.

7. MZARAI means a particular kind of reed and is applied to a river, a valley, and some marshy springs and the hills near these last.

8. SURKHA'B is the Red River.

9. ZARGHÚN means green, verdant, fresh and is applied to a range of mountains covered with forest in the heights and to a village by a stream.

10. LÚR means Upper and KÚZ, Lower, when found in composition with place-names. LO'WE' and LO' mean Greater: KÚCHNAI and KAUN, Lesser.

11. In MENTARZAI, MENTAR is Persian meaning "master, ruler." MENTARZAI would mean the Ruling Clan.

12. GHWAZII means a sluice and also the ear, and is found applied to a stream and a range of the hills, the SPÍN GHWAZII, (?) the White Ear Hills. ZHWAZH means the murmuring of a brook and may be the deriva-

\* A corruption of KÁLF CHUPPRÍ the Belóch name for the same place with the same meaning, *viz.*, Black Rock. Thus TÚKII KURAM is called also SO'R KURAM, which has the same meaning, Salt Springs.

† I do not here refer to such purely men's names as HABIBULLAH, KHÚSHDIL KHÁN, transferred to the villages owned by the persons of these names.

tion of the river name, whence perhaps also *ZHIZHA TANGAI* (?) the Rippling Pass.

13. Mt. *KAND* may derive its name from *KAND* a chasm or *KANDAI* broken ground.

14. Mt. *PfL* from its fancied resemblance to an elephant, *PfL* or *FfL*.

15. *SHARAN KA'RE Z* and *SHARAN* occurring two or three times and once as *SHE'RIN*, are probably for *SU'RIN*, sweet.

16. *SUR* or *SURAI* is red and is met with in several words. *SURAI* also means a passage and the so-called *SUBANA'RI* Pass (the *SURAI* Pass of my maps) is for *SURAI NARAI*, the Slender Passage. Cf. also *LA'NDAI SURAI* (?) the Lower Passage. *MO'MAND SARA'I* (?) the Momand's Passage.

17. The word *GHBARG*, as in *OGHBARG*, *IKHBARG*, *ILGBARG* and in the plural forms *GHOGBARGAI* and *OGHBARGAI*, occurs several times. It means the flat land between two hills, and upland valley: also double, two, twins. In which latter sense it is probably used when applied to hills. And hence also *NARAIGHBARG* Hills may mean the Narrow Valley Hills.

18. *RO'D* means merely a river: *RO'DBA'R*, a valley stream.

19. *KSHAI* means in, between, etc. and *KSHO'I KAREZ* might mean the Middle *Káréz*.

20. *KHWARA* is probably for *KHWARA*, a sandy stream-bed, as several such beds debouche into the *SHOR* valley at the spots so named.

21. *SAGAR*, *SRAGHAR*, *SARGHAR*, *SURGHAR* all common names mean the Red Hills (*SUR* + *GHA*R). So the *SAGARBAND* Pass would be the Red Hills Pass.

22. *SURKAI ZANGAL* is the Red Forest.

23. *DARGAI*, a very common name, is the plural of *DARGA*, a copse, a place where trees and brush-wood grow together. *DARGA* also means a shrine and this may account for its application to villages.

24. *GURKHAI* is applied to a mountain stream and its defile and may mean rattling, noisy, as *GARKAI* is the rolling of a carriage and *GARKANDA* a rolling stone from a mountain.

25. *ZAWAR* or *ZHAWAR* (*ZAWAR*) is a slope, declivity. *LWAR ZWAR* is uneven ground. *ZHAWAR* also means a deep or hollow place.

26. *USH* or *UKH* is the camel. The *USH* Pass means the Camel's Pass, and the *UKH MUGHDAI* Pass the Camel's Mouth Pass. (*UKH* + *MAKH*).

27. *UZHDO*, the name of a peak, is apparently the plural of *UZH*, *UZH*D and *UKD*, long, lengthy, stretched out.

28. *TSA'RU* Peak = ? the Look-out Peak.

29. The *MO'SAI* Pass may derive its name from *MO'SAI*, a child's marble, a round stone, or from *MO'ZI*, troublesome.

30. *KACH* is the cultivation by a stream-bed and is seen not only by itself as a name for a stream, a village and a hill, but constantly in compo-

sition, as **ISAF KACH**, Esau's Plot, **TA'ZI' KACH**, Greyhound Plot, **KO'SH KACH**, Crooked Plot, **WARIA KACH**, the Free Plot, **SUR KACH**, the Red Plot, **ZAGAN KACH** (?) the Rough Plot.

31. **SHO'E** which constantly appears as a name is probably for **SHO'RA** or **KHO'RA**, saltpetre, nitre: a common property of the soil along the route. It appears again in **SO'E KURAM**, the Salt Springs.

32. **SHNA' KHORAI** occurring as a synonym for **SHNAGHA'L**, a village name, would mean a Mastic Eater.

33. **TRI'KH** is salt, bitter, and appears in **TRIKHA'DAGH**, the Salt Hill-side, if **DA'GH** is for **TA'K**, or the Salt Plain, if **DA'GH** is for **DA'G**: and in **TRI'KH KURAM**, the Salt Springs.

34. **CHAPPAR** or **TSAPPAR**, a corruption of Hind. **CHHAPPAR** a thatched roof appears as a hill name in **Mt. CHAPPAR** and in **TO'E TSAPPAR**, the Black Roof, a hill in the Han Pass. Both peaks have rounded tops. It is worth mentioning here that **TSAPA** means a wave, billow.

35. **CHI'NAI** is a common village name and is the plural of **CHI'NA**, a spring, fountain.

36. **GHAR**, a hill, appears in **Mt. SPINSKHAR**, the White Hill: **SPH'RA-GHAR** Hills, the Grey Hills: **TANG GHAR**, the Narrow Hills. **ZHAR**, appearing in several hill names, is probably for **GHAR**: **ZHARPITAU** Peak, the Sunny Peak, **PLA'NZHARA** Hills, the Broad Hills; **ZHARUBAND** Peak, Hills End, is given to the last hill of a line in the **SHO'R** Valley.

37. **ISPIRA RA'GHA**, the Open Meadow (**SPARAI** + **RA'GH**); the place is an open spot near **Mt. MA'ZHWÖ**. **SPARAI**, open, also turns up once or twice as **SAPURAI**.

38. **Mt. SURLO'** (?) the Red Tablet.

39. **TANG TO'R** Peak, the Narrow Black Peak.

40. **SURTAK** Peak, the Red Precipice.

41. **MALE'WA** Peak (?) The Camel Sack (**MALAV**).

42. **LA'NDAL** Peak, the Lower Peak.

43. **PLA'N** Springs, the Wide Springs.

44. **KHUN'** Hills, the Bloody Hills.

45. **SHAKA'RE'Z** (?) The Back Kárez and **JALKA'RE'Z**, the Thorn Kárez; two villages near each other in the **BO'RAI** valley. **SHAKA'RE'Z** occurs twice.

46. **KUTSA** or **KUCHA** Valley means perhaps the Little Valley.

47. **TSA'HAN** Wells. **TSA'HAN** is the plural of **TSA'**, a well, pit. The word appears again as **UCHSAHA'N** Springs. (?) The Upper (**úr**) Springs.

48. **BA'GHU TO'R** Peak (?) The Black Bogie. **BA'GÚ** is a bugbear, bogie.

49. **BA'LA DHA'KA** (?) The Upper Plain (**pa'g**).

50. **HANOKAI** is probably a diminutive of **HAN**, the two passes being near each other.

51. **TOGHAI**, a river name, is **Turkí** for a reedy plain.

In a former paper in this Journal\* I remarked that a village may be called by six different names by guides, those thoroughly acquainted with the locality would recognise it by any one of them, others less well acquainted will only know it by some of them. Thus a village may be called (1) after the district or tract of land in which it is situated. TAKHT-I-PÚL is such a name, MEL MANDA is another; villages 10 miles apart are called TAKHT-I-PÚL and MEL MANDA simply because they are situated in the tracts so called. (2) It may be called after the section of the tribe which inhabits it, thus, BA'RAKZAI; (3) after the subdivision, thus, KHUNSE'ZAI or MOHAMMADZAI, (4) after its late owner if recently dead, (5) after its present owner, thus, KALA-I-NÚR-UD-DI'N KHÁN merely means NÚR-UD-DI'N KHÁN's village, and the owner's is usually the proper name of a village, (6) after its own name. To give an example; the village marked AMI'N KALA in my map of the ARGHISA'N valley was named to me as BA'RAKZAI, MUHAMMADZAI, AMI'N KHAN and LATI'F KHÁN. LATI'F KHÁN is its present owner: AMI'N KHAN was the late owner, MUHAMMADZAI is the subdivision and BA'RAKZAI the section of the tribe inhabiting it. It will be easily seen that the more general terms are known at a distance and the more specific ones only in the immediate neighbourhood of a village. Complicated as this system of nomenclature looks, it is natural enough in a country where the individual occupies such an important place in men's minds and nationality so little. It is not difficult to deal with in practice, after a slight knowledge of the country is acquired, but it accounts for the great apparent discrepancy in names and distances met with on maps and in routes. These remarks are true also of the TARI'N and KA'KAR country. Thus in the PISHIN, GANGALZAI and SHA'HDAD are names for the same place, and so are URUMZAI and SAYAD SA'LO and also BRIJA'N KALA and AULIA KALA. Several villages are called BRAHAMZAI, viz., SAYAD DO'ST MOHAMMAD, SAYAD KHAMA'NDAI, SAYAD LA'L. Three are called LÚR (Upper) KHA'NZAI, viz., MOHAMMAD SA'DIK, VAKI'L, and LA'L MOHAMMAD and two BAGARZAI, viz., SAYAD ALAB and SAYAD PAITO; two YA'SINGZAI, viz., SAYAD SHE'RBAT and SAYAD TO'TI. The more specific are the malik's (or owner's) names. In the case of the BRAHAMZAI villages, that of DO'ST MOHAMMAD may be called BRAHAMZAI proper, and the same is to be observed of the three KA'KOZAI villages in the same neighbourhood, one is called KA'KOZAI and the other two also MADAT and ATA' MOHAMMAD. On entering the DO'F valley the two villages known in the Pishin by several variations of the word ANGA'NG or NINGA'ND are found to be locally LÚR and KÚZ ANGANG, Upper and Lower ANGA'NG. Names, however, are more specific in the DO'F, and villages of the same name are distinguished by the tribal name in addition, thus TLARAI (YSA' KHEL) and

\* Rough notes on the Distribution of the Afghán Tribes about Kandahár. Vol. XLVIII, pt. I, 1879.

TLARAI (MEHTARZAI). In the BO'RAI valley, however, WAZIA'GAI and KHANKAI seem to be general names for groups of villages and we have two MÚRS and two WAHA'RS. In the wilder parts names become more general and merely descriptive, everything in the neighbourhood, valley, river, village and hills, all being known by the same name. Such are, O'BUSHTKAI, KHWA'RA, CHIMJA'N, KACH, BATA'NAI in the SHO'R valley, and in still wilder regions NANGALÚNA, TO'POBARGH, TRI'KHI KÚRAM, TSAMAULANG and BA'LA DITA'KA. Towards the Belóch Border double names, the Pathán and the Belóch are met with, as TO'R TSA'PPAR and KA'LI' CHUPPRI, both of the same meaning, the Black Hill: and BA'HAN KUND (Pathán) = BANI'WA'LA' KACH (Belóch).

Some names are corruptions and abbreviations; such as SAYAD SA'LO and SA'YAD ATU probably, and perhaps SKAN and ISKAN for Alexander (ISKANDAR): AJJI' for HA'JI': SAMALZAI for ISMA'ILZA': BRAHAMZAI for IBRAHIMZAI: ALIP and ALAB for HALAB (ALEPPO): and perhaps SOPA'NZAI for ISFAHA'NZAI.

In places there seems to be a tendency to call villages after the names of celebrated places, thus we have DI'LAT, LA'HO'R and MÚLTAT in the BO'RAI valley.

Before leaving this point I would remark that across the Belóch Border in BA'RKHO'M (or BA'RKHA'N) a similar if not a greater confusion of nomenclature exists. Thus the place called LUGA'RI' BA'RKHA'N is also called BANGALA': HASNI' KO'T = TA'NKHI SHAHR: CHA'HE'N = BA'BUL KHA'N KA KO'T or SHAHR: NA'NDIA' = SHE'KHI KO'T while all the NA'HAR villages are sometimes grouped as NA'HAN KO'T, and finally the valley itself is variously called BA'RKHO'M, BA'RKHA'N, LUGA'RI BARKHÁN, LÚNDIA'N and KAHQ.

Having now explained as far as possible the reasons why the nomenclature of travellers\* along the same route in Afghanistan should differ so greatly, and in order to clear the way for future students of this particular route, I close this paper by a comparison and identification of names found in the journals of other travellers with those to be found in my maps. Included among these are the nomenclature in Capt Holdich's plane-table sketch-map of the Route and in the Quarter Master General's Departmental sketch-map, and also the names given in Major Waterhouse's paper in this Journal.†

\* Capt. Heaviside remarks on the difficulty of obtaining Afghan names, in Major Waterhouse's report, pp. 53. J. A. S. B. Vol. XVIII, pt. II, 1879.

† The works referred to in the comparison are Notes on the Survey Operations in Afghanistan in connection with the Campaign of 1878-9 by Major Waterhouse, J. A. S. B. 1879. Mackenzie's Routes in Asia, Sec. II, Afghanistan. Macgregor's Gazetteer, Afghanistan, Leech's Route: Dera Gházi Khán to Kandahár. Lumsden's Mission to Kandahár. A more detailed identification of the names along the route will be found in the appendix to my paper in the J. R. G. S. above referred to.

I.—*Han Pass and Neighbourhood.*

| Temple.           | Macgregor.         | Sandeman.    | Hollich.    | Q. M. G.     | Waterhouse.  |
|-------------------|--------------------|--------------|-------------|--------------|--------------|
| MA'R PASS         | MA'R               | ...          | MA'R        | MA'E         | ...          |
| ISHA'NI           | ISA'NI             | ...          | ...         | ...          | ...          |
| DA'KA (BA'EKHA'N) | DAKKU KO T         | ...          | DAKKU KHA'N | DAKKA        | ...          |
| TO'E TSAPPAR      | KA'LA CHAPRI       | ...          | ...         | ...          | ...          |
| KA'LI' CRUPPRI    | KA'LA CHAPR        | ...          | ...         | ...          | ...          |
| HANOKAI PASS      | HANKI' SAR         | ...          | HANNOKAI    | HANNOKOI     | HANUKAI.     |
| KUTSA Valley      | KUCHA              | ...          | ...         | ...          | ...          |
| TEI'KH KURAM      | SO'R KURAM         | ...          | TREKH KURAM | TREKH KURAM  | TEIKH KURAM. |
|                   | PAINDEH KHA'N KO'T | ...          | ...         | ...          | ...          |
|                   | PAINDEH KHA'N LUNI | ...          | ...         | ...          | ...          |
|                   | PAINDEH KHAN SHAHR | ...          | ...         | ...          | ...          |
|                   | PAINDEH KHA'N KO'T | ...          | ...         | ...          | ...          |
|                   | LUNI               | ...          | ...         | ...          | ...          |
|                   | PAINDEH SHAHR      | ...          | ...         | ...          | ...          |
| BA'LA DHA'KA      | BA'LA DA'KA        | BA'LA DHA'KA | BA'LA DA'KA | BA'LA DA'KA  | BA'LA DA'KA. |
| BA'LA DHA'KI      |                    |              |             |              |              |
| CHO'R TARAP       | CHO'R TRAP         | ...          | ...         | CHO'E KI TAP | ...          |
| JA'NDREA'N Hills  | JA'NDRA'N          | ...          | JA'NDRA'N   | JA'NDRA'N    | ...          |
| DHAULA Hills      | DHA'OLA            | ...          | DHOWLA      | DHOWLAH      | ...          |
| R. KA'HAN         | R. KA'HA           | ...          | ...         | ...          | ...          |
| TSAMAULANG        | CHUMA'LANG         | ...          | CHAMA'LANG  | CHAMA'LANG   | CHAMA'LANG   |
| R. LA'KI          | R. LA'KI LAHAR     | ...          | ...         | ...          | ...          |
| BA'EKHO'M         | BA'EKHA'N          | ...          | BA'EKHA'N   | BA'EKHA'N    | BA'EKHA'N.   |
| BA'EKHA'N         |                    | BA'EKHA'N    | BA'EKHA'N   | BA'EKHA'N    | BA'EKHA'N.   |

| Temple.       | Macgregor.        | Sandeman. | Holdich. | Q. M. G.          | Waterhouse. |
|---------------|-------------------|-----------|----------|-------------------|-------------|
| MITHÍ KHÚN    | MITA KOH          | ...       | HAN KÚA  | HAN KÚ'A          | ...         |
| BA'HAN KUND   | BA'HANWA'LA' KACH | ...       | ...      | BA'HANWA'LA'KA'CH | ...         |
| {             | BARBO'J           | ...       | ...      | ...               | ...         |
|               | BARBO'Z           | ...       | ...      | ...               | ...         |
|               | BAGHA'O           | ...       | ...      | ...               | ...         |
| BAGHA'O       | ? SHINGHAR        | ...       | ...      | ...               | ...         |
| SRAGHAR       | ? SANGHAI         | ...       | ...      | ...               | ...         |
| (Lóni Valley) |                   |           |          |                   |             |

II.—*Tal, Chotiali, and Neighbourhood.*

| Temple.    | Macgregor. | Sandeman.  | Holdich.   | Q. M. G.   | Waterhouse. |
|------------|------------|------------|------------|------------|-------------|
| CHO'TIA'LI | CHO'TA'LI  | CHO'TA'LI  | CHO'TIA'LI | CHO'TIA'LI | CHO'TIA'LI  |
| KO'LU      | KO'LU      | KO'LU      | KO'LU      | KO'LU      | ...         |
| TAL        | THAL       | THAL       | TULL       | THULL      | THAL.       |
| RA'HA      | RA'H       | ...        | RA'HA      | REHI       | REHL        |
| {          | RA'HI      | ...        | ...        | ...        | ...         |
|            | BAGHA'O    | ...        | BAGHA'O    | BAGHA'O    | BAGHA'O.    |
|            | SMALAN     | ...        | SMALAN     | SMALAN     | SMALAN.     |
| SHINLE'Z   | SHINJA'ZAI | SHINJA'ZAI | SHINLAZE   | SINGLAZI   | ...         |
| SINJA'AI   | ...        | SHINJA'VI  | SINGA'WI   | SANJA'WI   | SAGA'WE.    |
|            | ...        |            |            |            |             |

III.—*Bórai Valley and Neighbourhood.*

| Temple.       | Macgregor. | Holdich. | Leach. | Q. M. G. | Waterhouse. |
|---------------|------------|----------|--------|----------|-------------|
| Bo'RAI Valley | Bo'RA      | BHO'RI   | Bo'RI  | Bo'RI    | Bo'RI.      |
| Bo'RI         | Bo'RI      |          |        |          |             |
| R. HARUMBA'B  | ANABA'B    | ANUMBA'B | ...    | ANAMBA'B | ANAMBA'B.   |
| HANUBA'B      | M'KHTAB    | ...      | ...    | ...      | ...         |
| M'KHTAB       | NIGA'NDH   | NINGA'N  | ...    | NINGA'N  | NINGA'N.    |
| NINGA'ND      | INGA'D     |          | ...    |          |             |
| BARMINAI      | BARNEMAI   | BARNEMAI | ...    | BA'NEMAI | ...         |
| ME'ND Pass    | ? MENA     | ...      | ...    | ...      | ...         |
| NAIGWA'L      | ? GWA'L    | ...      | ...    | ...      | ...         |
| R. LO'RALAI   | * LOORALAE | ...      | ...    | ...      | ...         |
| SHABOZAI      | SHABOZAI   | SHABOZAI | ...    | ...      | ...         |

IV.—*Shór Valley to Pishin Valley.*

| Temple.        | Macgregor. | Sandeman. | Leach.        | Lumsden. | Holdich. | Q. M. G. | Waterhouse. |
|----------------|------------|-----------|---------------|----------|----------|----------|-------------|
| DARGAI         | DARGAI     | ...       | ...           | DARGA'E  | DARGAI   | DARGAI   | ...         |
| (SHO'B Valley) | DARGI      | ...       | ...           | ...      | CHINA'LI | CHINA'LI | ...         |
| CHINA'LI       | ? CHENA'TI | ...       | ...           | ...      | CHINA'LI | CHINA'LI | ...         |
| CHIMJA'N       | ...        | ...       | CHINJA'N      | CHINJA'N | CHIMJA'N | CHINJA'N | CHINJA'N.   |
| MT. CHAPAR     | CHAPR      | ...       | ...           | ...      | ...      | ...      | ...         |
| CHAPR          | CHAPR      | ...       | ...           | ...      | ...      | ...      | ...         |
| ZAGAN KACH     | ...        | ...       | ? SAKAN       | ...      | ...      | ...      | ...         |
| R. SURKHA'B    | ...        | ...       | SURKHA'B Ford | ...      | SURKHA'B | SURKHA'B | ...         |
| (DO'P Valley)  | ...        | ...       | ...           | ...      | ...      | ...      | ...         |

| Temple.    | Macgregor.                   | Samdeman.  | Holdich. | Q. M. G.                            | Waterhouse. |
|------------|------------------------------|------------|----------|-------------------------------------|-------------|
| KACH       | ? KARGAH                     | ...        | ...      | KATS                                | ...         |
| DUMAR      | DUMAD                        | ...        | ...      | DUMAR                               | ...         |
| SPÉZHANDAI | ...                          | SPINZANDAI | ...      | SPÉZANDAI                           | ...         |
| ISAF KACH  | { YU'SAF KACH<br>ISAB KACH } | ISAB KACH  | ...      | YU'SUF KACH YU'SAF KACH EUSAF KACH. |             |
| NINGA'ND   | ...                          | NAGA'ND    | ...      | ANGA'ND                             | NINGA'N.    |
| ANGA'NG    | ...                          | ...        | ...      | ...                                 | ...         |
| KA'KAR     | KA'KAR                       | KA'KUR     | ...      | KA'KUR                              | KA'KAR.     |

V.—*Pishin Valley and Neighbourhood.*

| Temple.                  | Macgregor. | Samdeman. | Holdich.             | Leech. | Lumsden.  | Q. M. G.                  | Waterhouse.        |
|--------------------------|------------|-----------|----------------------|--------|-----------|---------------------------|--------------------|
| AMAND KHE'L              | SANATYA    | ...       | ...                  | ...    | SIMANTHA  | ...                       | ...                |
| SH'A'DA'D                | ...        | ...       | ...                  | ...    | SH'A'DA'D | ...                       | ...                |
| KALA-I-ABDULLA-<br>KHA'N | ...        | ...       | ...                  | ...    | ...       | { KILA ABDUL-<br>LA KHA'N | KILA ABDUL-<br>LA. |
| PISHIN                   | PESHIN     | PESHIN    | PESHIN               | PESHIN | PESHIN    | PESHIN                    | PISHIN.            |
| KHO'JAK                  | KHO'JAK    | KHO'JAK   | KHO'JAK              | ...    | ...       | KO'JAK                    | KHO'JAK.           |
| BARSHO'E                 | BARSHO'RA  | ...       | BARSHO'R             | ...    | ...       | ...                       | ...                |
| SAYAD PAIND              | PAIN KALA  | ...       | SATPA'N<br>SAIPAIN } | ...    | ...       | SAIPA'N                   | ...                |

A comparison of the names to be found on the three latest maps of this route, namely, those of my own, Capt. Holdich, and the Quarter-Master General's Department, will complete my observations.

*From the Pishin eastwards.*

| Temple.             | Holdich.          | Quarter-Master General. |
|---------------------|-------------------|-------------------------|
| KADANEI Valley      | KADANAI           | KADANEI.                |
| KHO'JA AMRA'N Hills | KILO'JA AMRA'N    | KHO'JEH AMRA'N.         |
| KHWA'JA AMBAN Peak  | KWA'JA AMRAN      | ...                     |
| KALA ABDULLAH KHA'N | KILLA ABDULA      | KILA ABDULA KHA'N.      |
| GWA'JA Pass         | GWA'JA            | GWAJA.                  |
| TANGAI              | TANGI             | ...                     |
| KHO'JAK Pass        | KHO'JAK           | KO'JAK.                 |
| ARAMBI              | ARUMBI            | ARUMBI.                 |
| RAHAMDIL KHA'N      | RA'MDIL KHA'N     | ...                     |
| BADWA'N             | BUDWA'N           | BADWA'N.                |
| TURKHE'L            | TURKHE'L          | TURKHAIL.               |
| BRIJA'N KALA        | MAISAI & PAIZI    | ...                     |
| SAYAD SALO          | URAMZAI           | ...                     |
| URUMZAI             |                   |                         |
| SHA'HDA'D           | GANGALZAI         | ...                     |
| GANGALZAI           |                   |                         |
| AJABZAI             | AJABZAI           | AJABZAI.                |
| SATAMZAI            | SE'MZAI           | SE'MZAI.                |
| ALIZAI              | ALAZAI            | ALI'ZAI.                |
| R. TO'GHAI          | TO'GHAI           | ...                     |
| R. MUZARAI          | MUZARAI           | ...                     |
| SOPA'NZAI           | ZE'RI             | ...                     |
| BRHAMZAI            | { BRAHAMZAI }     | ...                     |
|                     | { BRAINZAI }      | ...                     |
| MA'LIKAI            | MA'LIZAI          | ...                     |
| BAGARZAI            | BAGGARZAI         | BAGARZAI.               |
| SAMA'LZAI           | SMA'LZAI          | SMA'LZAI.               |
| SAYAD PAIN          | SAIPA'N & SAIPAIN | SAIPA'N & PAIN KALA.    |
| NOA' BA'ZA'R        | ...               | NOA' BA'ZA'R.           |
| MANZAKAI            | MANZAKAI          | MANZAKAI.               |
| KHA'NZAI            | KHA'NZAI          | KHA'NZAI.               |
| SHE'KHA'LZAI        | SHEIKHA'RI        | SHEIKHAHA'RI.           |
| KHUSHDIL KHA'N      | KUSHDIL           | KHUSHDIL.               |
| R. BARSO'           | BARSO             | BARSO'.                 |
| MA'LIKYA'R          | MA'LIKYA'R        | MA'LIKYA'R.             |

| Temple.           | Holdich.                   | Quarter-Master General |
|-------------------|----------------------------|------------------------|
| KAMA'LZAI         | KAMA'LZAI                  | KAMA'LZAI.             |
| NU'EZAI           | NA'BIA'N                   | NA'BIA'N.              |
| YA'SINGZAI        | ASIMZAI                    | ASIMZAI.               |
| TARI'N            | TURI'N                     | TURI'N.                |
| SURAI Pass        | SURINA'RI                  | SURUNA'RI.             |
| ANGA'NG           | ANGA'ND                    | NINGA'ND.              |
| R. SURKHA'B       | SURKHA'B                   | SURKHA'B.              |
| MOHAMMAD SHARFI   | SABIA'DA KA'RE'Z           | SABEA'DA KA'RE'Z.      |
| MT. KAND          | KUND                       | KAND.                  |
| MEHTARZAI         | ME'TRAZAI                  | ME'TRAZAI.             |
| TLARAI            | TALARAI                    | LARAI.                 |
| MURGHAI           | MURGHA'                    | MURGHA'.               |
| SHIRAN            | SHIRAN                     | ...                    |
| NARI'N            | ...                        | NARI'N.                |
| BALUZAI KA'RE'Z   | BALUZAI                    | BULUZAI.               |
| SA'GHAI           | SARGAI                     | SARGAI.                |
| SAMA'WAN          | ZEMIRSTA'N                 | ZEMIRSTA'N.            |
| KHA'NIZAI KA'RE'Z | KHA'NZAI                   | KHA'NZAI.              |
| SHAKAR            | SAKKAR                     | SAKKAR.                |
| ZARGHU'N KA'RE'Z  | ZERGU'N KA'RE'Z            | ...                    |
| KSHO'I KARE'Z     | KUSO'I                     | KUSO'I.                |
| R. RO'D           | TO'GAI                     | TO'GAI.                |
| GWA'L             | GWA'L                      | GWA'L.                 |
| PISHIN            | PISHIN                     | PE'SHI'N.              |
| MT. TAKATU'       | TAKATU'                    | TA'TUCKA.              |
| WOCHAKHLA         | TURA KALA                  | ...                    |
| UKHMUGHDAI Pass   | OKHMUKHZAI                 | UCHMUCHZAI.            |
| R. ZADU'N         | ...                        | ZERDU'N.               |
| AMADU'N           | AMADU'N                    | AMADU'N.               |
| MT. ZARGHU'N      | ZERGHU'N                   | ZERGHU'N.              |
| KA'KUR            | KA'KUR.                    | KA'KUR.                |
| ISAF KACH         | YUSUF KACH                 | YUSAF KACH.            |
| USH Pass          | USHTA'RA                   | USHTA'RAH.             |
| MT. MASHKWAB      | MASHKWAB                   | MASHKWAB.              |
| SPE'ZHANDAI       | SPE'ZANDAI                 | SPE'ZANDAI.            |
| ISPIRA RAGHA      | { SPIRARAGHA<br>SPIRABGH } | SPIRABA'GHAN.          |
| MT. SPINSKHAR     | ...                        | SPINSKHAR.             |
| DUMAR             | DUMAR                      | ...                    |
| MT. SURGHWAND     | SURKAND                    | ZERGU'N.               |
| ZHO'B Valley      | ZHO'B                      | ZHO'B.                 |

| Temple.            | Holdich.                     | Quarter-Master General. |
|--------------------|------------------------------|-------------------------|
| NANGALU'NA Pass    |                              |                         |
| MO'MAND SARA'I     | MO'MANDGAI                   | MAMANAGI.               |
| MO'MAND            |                              |                         |
| O'BUSHTKAI         | O'BOSKOI                     | O'BOSKOI.               |
| CHIMJA'N           | CHIMJA'N                     | CHINJA'N.               |
| PA'LEKAI Pass      | PA'LEI'                      | PA'LEI'.                |
| WARGHAS            | WERGUS                       | ...                     |
| HINDU BA'GH        | HINDU BA'GH                  | HINDOO BA'GH.           |
| GURMAI             | GURMI'                       | GURMI'.                 |
| MT. MATKHILAR      | MASHKHILAR                   | MASHKILAR.              |
| MT. STA'JGAI       | SIA'SGAI                     | SIA'SGAI.               |
| DARGAI             | DARGA'                       | DARGAI.                 |
| CHINA'LI           | CHINA'LI                     | CHINA LI.               |
| SUNGALU'N          | SHUNDLU'N                    | SHU'N LU'N.             |
| KA'SAI Hill        | MANA'RA                      | MANA'RA'.               |
| KACH               | KATS                         | KATS.                   |
| BAIA'NAI           | BIA'NI                       | BIA'NI.                 |
| SARKAI ZANGAL      | SKAIJANGAL                   | SKAIJANGAL.             |
| NINGA'ND           | NIMGA'N                      | NINGA'N.                |
| GHOBARGAI Hill     | GOBARGI'                     | GOBARGI'.               |
| SMALAN             | SMALAN                       | SMALAN.                 |
| SINZAWAI           | SINGA'VI                     | SANJA'VI. *             |
| SHINLE'Z           | SINGLAZE                     | SINGLAZI.               |
| BAGHA'WA           | BAGHA'O                      | BAGHA'O.                |
| JALKA'RE'Z         | KA'RE'Z                      | KA'RE'Z.                |
| SHAKA'RE'Z         | SHAHKA'RE'Z                  | SHAHKA'RE'Z.            |
| TO'B KHAIZE' Hills | { DURGAINNI<br>DARMANGARIH } | DURGUNNY.               |
| LASHTAI            | LASHTAI                      | LUSHTAI.                |
| WARIA'GAI          | URIASGAI                     | URIAGAI.                |
| ZANGIWA'L          | ZANGIWA'L                    | ZANGIWA'L.              |
| KHANKAI            | { KONKAI<br>CHAPLAI }        | { KONKAI<br>CHAPLAI. }  |
| RO'DLI'N           | KUDISAI                      | ...                     |
| NAVGIYVA'LA        | MALAIYAM                     | MALAIAN.                |
| LA'HO'B            | LA'HOB                       | LAHORE.                 |
| DI'LAI             | DELHI                        | DELHI.                  |
| MU'LTAT            | MUDDUK *                     | MUDDUH.                 |
| DARGAI             | DARGAI                       | DARGAI.                 |
| SHABOZAI           | SHABOZAI                     | SHABOZAI.               |
| SHARAN             | SHO'RA'N                     | SHORA'N.                |

| Temple.           | Holdich.    | Quarter-Master General. |
|-------------------|-------------|-------------------------|
| BARMINAI          | BARANMAI    | BAMEMAI.                |
| DA'LO'R           | BA'MEMAI    | DALUR.                  |
| SAGHARAI          | DALU'E      | SAGRE'.                 |
| CHINA' KO'T       | SAGRE'      | CHINNA.                 |
| KACHAI            | CHINNA      | KATSAL.                 |
| KANA'             | KATSAL      | KHANA.                  |
| KACH              | KHANA       | KHAS.                   |
| SHARAN            | KATS        | SHORAN.                 |
| SHA'BA'N          | ...         | SHAMURLAK.              |
| KAUN WAHA'R       | SHAMURLAK   | AWA'HAB.                |
| KURU              | AWAHA'B     | KHURU.                  |
| HANUMBA'R         | KHRU        | ANAMBAR.                |
| GADIWA'R          | ANUMBA'R    | GADBAR.                 |
| SARGHAR Peak      | GADBA'R     | TATARI.                 |
| LU'NI             | TATRI       | LU'NI.                  |
| SHAUGWA'L         | LU'NI       | SHANGOLAI.              |
| TRI'KH KURAM      | SHANGOLAI   | TREKH KURRAM.           |
| RAHA              | TREKH KURAM | REHI.                   |
| TAL               | RAHA        | TAL.                    |
| CHO'TIA'LI        | TULL        | CHO'TIA'LI.             |
| KO'LU             | CHO'TIA'LI  | KO'LU.                  |
| BRAHAMZAI KHELA'T | KO'LU       | BA'RAMZAI.              |
| MA'R Pass         | PA'RAMZAI   | MA'R                    |
| TSAMAULANG        | MA'R        | CHAMA'LANG.             |
| HANOKAI Pass      | CHAMA'LANG  | HANNAKAI.               |
| BA'LA DHA'KA      | HANNAKAI    | BA'LLADA'KA.            |
| MUTTHI' KHU'I'N   | BA'LLADA'KA | HANKU'A.                |
| HAN Pass          | HANKU'A     | HAN.                    |
| JA'NDHRA'N Hills  | HAN         | JA'NDRA'N.              |
| CHO'R TARAP       | JA'NDRA'N   | CHO'R KI' TAP.          |
| BA'HAN KUND       |             | BA'HANWA'LA' KACH.      |
| CHAPAR Hills      | CHAPAR      | CHAPAR.                 |

*On the Sūryaprajñapti*.—By DR. G. THIBAUT, Principal, Benares College.

## PART II.

(Continued from p. 127.)

Although ancient Indian astronomy was chiefly interested in the moon and although the greater part of the *Sūryaprajñapti* treats of her, especially of the places she occupies at different times in the circle of the nakshatras, a detailed connected account of her motions is not given anywhere, and we must combine the hints we meet with here and there, in order to understand the theory by which the old *tīrthan-kāras* tried to explain to themselves her motion. In doing this we are of course greatly aided by the full and unambiguous account given of the sun's motion, since it will not be presuming too much that the theory which had been applied to the one luminary would be applied to the other one also. As we have seen above, the sun's daily apparent motion is regarded to be his true one and considered to take place round Mount Meru; his yearly motion is the consequence of his moving more slowly than the stars; his motion in declination is the result of his describing round Mount Meru circles of varying diameter. All this is applied to the moon too. The moon describes (or the two moons describe) circles round Mount Meru at the height of eight hundred and eighty yojanas above the earth, so that her place is eighty yojanas above that of the sun. She moves slower than the stars and slower than the sun; while the latter describes during one yuga 1,830 (or strictly speaking 915) circles, the moon describes only 1,768 (or again on the assumption of two moons 884) such circles; the difference of the two numbers = 62 indicates the number of times the moon enters into conjunction with the sun. During the same period, *viz.*, the quinquennial yuga, the moon completes sixty-seven sidereal revolutions. Each of these revolutions is, analogously to the sun's revolutions, divided into two *ayanas*, an *uttarāyana* and a *dakṣiṇāyana*, according as the moon is proceeding towards the north or the south (of the equator as we should add). In reality, it is true, the motion of the moon is much more complicated, as it is not only oblique to the equator, like the ecliptic in which the sun is moving, but also inclined to the ecliptic itself at an angle of about  $5^\circ$ , while moreover at the same time the points in which the moon's path cuts the ecliptic are continually receding. One of the consequences of the revolution of the nodes did, as we shall see below, not escape the observation of the author of the *Sūryaprajñapti*, but he was manifestly unable to account for it by a modification of his theory. According to him the moon, like the sun, simply describes concentric circles round Mount Meru, some-

times approaching it sometimes receding from it. While, however, the period of the sun's progress from and towards Mount Meru comprises one year—the time which the sun employs in arriving again at the same star—the corresponding period of the moon embraces one nakshatra month = 27 days,  $9\frac{3}{7}$  muhūrtas. From this it is easy to find the number of the circles the moon describes. She performs during one yuga 1,768 complete revolutions, consequently during one nakshatra month  $\frac{1768}{67} = 26\frac{26}{67}$  revolutions, and during one ayana or sidereal half month  $13\frac{13}{67}$  revolutions. The moon therefore proceeds towards the north during the time which she wants for describing  $13\frac{13}{67}$  circles, and after that she proceeds towards the south for the same length of time. From this it follows that, while the sun has 184 different circles to describe, the moon has fifteen such circles only. At the beginning of the yuga she leaves the outermost circle and begins her uttarāyana, describes the thirteen circles intermediate between the outermost and the innermost ones and enters into the fifteenth (innermost) circle, through  $\frac{13}{67}$  parts of which she passes. After that the sidereal half moon has elapsed, and the moon has to retrace her steps towards the south. She therefore leaves the innermost circle unfinished, returns into the next one, passes again through the 13 intermediate circles and enters into the 15th (outermost) circle. After she has passed through  $\frac{13}{67}$  parts of the latter, the sidereal half moon is again over and the progress towards the north recommences. Thus the moon moves in 15 circles of different diameter, but only 13 she passes through in their entirety while a fractional part only of the two exterior circles are touched by her. We have seen above that the vikampa-kshetra of the sun, *i. e.*, the extent to which the sun moves sideways in his northern and southern progress is estimated at 510 yojanas ( $= 183 \times 2\frac{48}{61}$ ; the latter quantity being the amount of the daily vikampa); the vikampa-kshetra of the moon is estimated at nearly the same amount, *viz.*,  $509\frac{53}{61}$  yojanas (it has been already remarked that the inclination of the moon's path to the ecliptic is not known to the Sūryaprajñapti). The diameter of the moon herself is estimated at  $\frac{56}{61}$  yojanas, the interval between consecutive circles described by the moon at  $85 + \frac{30}{61} + \frac{4}{7 \times 61}$  yojanas; the sum of these two quantities is  $86 + \frac{25}{61}$

+  $\frac{4}{7 \times 61}$ , which multiplied by 14, gives the above stated amount  $\left(509 \frac{53}{61}\right)$  as the whole vikampakshetra during one lunar half month.

Here—as likewise above with reference to the sun—the Sūryaprajñapti does not directly speak of the diameter of the moon, but of the measure of the breadth of the circle described by the moon; but the two things come to the same. The manner in which the moon, after having completed one of her circles, passes over into the next one is not expressly detailed; we imagine it similar to that of the sun.

In connexion with this account of the moon's motion, the Sūryaprajñapti enters into a curious calculation, of no practical, and it can hardly be said any theoretical interest, which, however, may be mentioned here as a specimen of the accuracy with which the system is worked out into its minutest details. The question is raised: what circles are common to the sun and moon and how far are those of the moon's circles which belong to the sun also touched by the latter? As the moon's circles are elevated above those of the sun by the amount of eighty yojanas, strictly speaking not any circle is common to both; common to both are, however, said to be those circles of the moon which when projected upon the plane in which the sun describes his circles partially or entirely coincide with the latter. The vikampa-kshetras of the two being nearly equal, while 15 circles of the moon correspond to 184 circles described by the sun, the consequence is that the by far greater portion of the sun's circles do not coincide with the moon's circles, but fall into the wide intervals separating the latter, one from another. Thus for instance the first (innermost) circle of the sun coincides with the first circle of the moon, so that when both luminaries move in their innermost circles their distance from Mount Meru is equal; only the circle of the moon overlaps that of the sun by  $\frac{8}{61}$  yojanas, this being the difference of the breadth of the circles described by the two (of the diameters of the two bodies). The next twelve circles of the sun all fall into the interval between the first and the second circle of the moon; for this interval (plus the overlapping  $\frac{8}{61}$  of the first circle) amounts to  $35 + \frac{38}{61}$  +  $\frac{4}{7 \times 61}$  yojanas, while the vikampa-kshetra of twelve solar circles amounts to  $33 \frac{27}{61}$  yojanas only. After that two yojanas are occupied by the interval between the 13th and the 14th solar circles, and then the fourteenth solar circle begins, which therefore partly coincides with the second lunar circle. By continuing these calculations for all lunar circles, it is

found that the first up to the fifth inclusive, and again the eleventh up to the fifteenth inclusive are "*súrya-sammiśrápi*," *i. e.*, partly coincide with solar circles, while the sixth up to the tenth do not coincide with solar circles, the latter falling entirely into the intervals between the named lunar circles. To reproduce here all the details of the calculation would be purposeless.—That the preceding account of the moon's motion agrees with the ideas of the author of the *Súryaprajñapti* is to be concluded from the formulas given in different parts of the work for the performance of certain calculations. Thus for instance the question is raised, in what *ayana* and what circle each *parvan* takes place, *i. e.*, how many *ayan*as have elapsed at the different times when the moon enters into conjunction or opposition and in which of the fifteen circles she is moving just then. This question is answered by some ancient *gáthás* quoted in the commentary, according to which the calculation has to be made as follows. The constant quantity—the  $\frac{4}{67} + \frac{9}{31 \times 67}$ —which is to be used for the calculation of each *parvan*, is equal to

$$1 + \frac{4}{67} + \frac{9}{31 \times 67}, \text{ viz., of one of the circles described by the moon.}$$

This quantity is of course easily found by the following consideration. The moon which describes in one *yuga* 1,768 circles describes in one *parvan*  $\frac{1768}{124} = 14 \frac{8}{31}$  circles and in one *ayana*  $13 \frac{13}{67}$  circles; the difference of these two quantities is the above mentioned constant quantity. The rule for finding the places of the *parvans* is now as follows: The way accomplished by the moon during one *parvan* being equal to the way accomplished during one *ayana* plus  $1 + \frac{4}{67} + \frac{9}{31 \times 67}$  circles, take at first as many *ayan*as as the number of the *parvan* whose place is wanted indicates, multiply then the constant quantity by the number of the *parvan*, and if the result exceeds  $13 \frac{13}{67}$ , deduct it from this latter quantity (which subtraction

if necessary has to be repeated until the remainder is less than  $13 \frac{13}{67}$ ); as often as this subtraction is performed as many unities are to be added to the number of *ayan*as found above and—unless the subtraction leaves no remainder—one additional unity is to be added; add two to the remainder; the resulting sum will indicate the circle in which the moon stands at the *parvan*. Regarding this latter point it is to be remembered that the circles are to be counted from the innermost circle when the number of the *parvan* is an even one and from the outermost circle when it is an odd one. To illustrate this let us take one of the many examples given by the Commentator. Required the place of the moon at the fourteenth *parvan*. Multiply at first one by fourteen, that means: fourteen *ayan*as have elapsed

at the time. Then multiply  $1 + \frac{4}{67} + \frac{9}{31 \times 67}$  by fourteen; the result is  $14 + \frac{56}{67} + \frac{126}{31 \times 67} = 14 + \frac{60}{67} + \frac{2}{31 \times 67}$ . This is the number of circles which the moon has passed through during fourteen parvans in addition to fourteen ayanas. As this number exceeds the number of circles passed through in one ayana (*viz.*,  $13 \frac{13}{67}$ ), the latter number has to be deducted from it and one has to be added to the number of ayanas. We see that the moon has performed 15 ayanas at the end of the 14th parvan. The remainder left after the above deduction shows the number of circles which the moon has passed through in addition to the 15 complete ayanas; in our case these amount to  $1 + \frac{47}{67} + \frac{2}{31 \times 67}$ . As there is an excess above 15 complete ayanas, we have according to the rule to add one to their number, *i. e.*, the parvan takes place in the sixteenth ayana. And since the moon enters at the beginning of the ayana into the second circle (the circles being counted from the innermost as well as the outermost) and since in our case the moon has completed more than one full circle, two has to be added to the number of circles found above in order to obtain the ordinal number of the circle in which the moon stands at the expiration of the 14th parvan. The full answer is therefore: the 14th parvan takes place in the sixteenth ayana, in the third circle (reckoning from the innermost circle),  $\frac{47}{67} + \frac{2}{31 \times 67}$  of this circle having already been passed through. In the same manner the places of all other parvans may be easily found; the commentator gives the places of parvan I—XV; but it would serve no purpose to extract them here. What has been given will suffice to justify the hypothetical account of the moon's motion detailed above.

The question regarding the relative velocity of sun, moon and stars which is raised in the 15th book finds its answer in accordance with the general principles of the system. The apparent daily motion being considered as the real one, it follows that the nakshatras travel faster than the sun, and the sun again faster than the moon; the space passed through by each of these bodies during a month, day, muhūrta, etc. is calculated and exhibited in detail; we need, however, only remember that the sun describes in one yuga 1,830 circles, while the moon describes only 1,768 and the nakshatras—through whose circle the sun passes five times—describe 1,835. From these relations all special values can be easily derived. It is just mentioned—no details being given—that the planets (*graha*) travel faster than the sun and the stars (*tārāh*) faster than the nakshatras. It is needless to discuss the former of these two assertions; the latter is of course

entirely indefensible and no reason leading to it can well be imagined. This is the only time that the stars—excluding the nakshatras—are mentioned in the Sūryaprajñapti as far as we can judge from the commentary.

The next point to be considered is the information the Sūryaprajñapti furnishes with regard to the nakshatras. Incidentally it has already been remarked that the number of the nakshatras is invariably stated as being twenty-eight, and that the nakshatras are as invariably treated as being of different extent. The particulars are as follows :

\* According to their extent or, to look at it from another point of view, according to the time during which sun and moon are in conjunction with them, the nakshatras are divided into four classes. Firstly, those with which the moon is in conjunction during one ahorātra = thirty muhūrtas ; to this class belong Revatī, Āśvinī, Kṛittikā, Mṛigaśīras, Pushya, Maghā, Pūrvaphālgunī, Hasta, Chitrā, Anurādhā, Mūla, Pūrvāshāḍhā, Śravaṇa, Śraviṣṭhā, Pūrvabhādrapadā. The one ahorātra for which the conjunction lasts may be expressed as  $\frac{2010}{67}$  muhūrtas, the convenience of which expression will appear at once. The second division comprises those nakshatras which are in conjunction with the moon for half a nycthemeron = fifteen muhūrtas =  $\frac{1005}{67}$  muhūrtas ; to this division belong Śatabhishaj, Āśleshā, Bharanī, Jyeshṭhā, Ārdrā, Svātī. To the third division belong those nakshatras with which the moon is in conjunction for one and a half nycthemeron = 45 muhūrtas =  $\frac{3015}{67}$  muhūrtas ; these nakshatras are Uttarāshāḍhā, Uttaraphālgunī, Uttara-bhādrapada, Punarvasu, Viśākhā, Rohiṇī. The fourth division comprises one nakshatra only, viz., Abhijit, with which the moon is in conjunction for  $9\frac{27}{67} = \frac{630}{67}$  muhūrtas. We see now for what reason the time of conjunction has been expressed throughout in sixty-sevenths of a muhūrta ; it was done for the purpose of obtaining homogeneous expressions for all nakshatras. At the same time these fractions furnish us with an easy means for calculating the time during which the sun is in conjunction with each nakshatra ; for five revolutions of the sun occupying the same time as sixty-seven revolutions of the moon, we have only to replace the denominator of the above fractions by five. The result of this operation having been turned into nycthemera, we find as the expression for the time during which the sun is in conjunction with the nakshatras of the four divisions the four following terms : 13 days, 12 muhūrtas ; 6 days, 21 muhūrtas ; 20 days, 3 muhūrtas ; 4 days, 6 muhūrtas.—According to the space the nakshatras occupy they are either samakshetra, occupying a mean (medium) field or apārdhakshetra, occupying

half a field or *dyardhakshetra*, occupying one field and a half. There is no special name for the extent of *Abhijit*.

In connexion with this division of the *nakshatras* into different classes according to the space they occupy or the time during which they are in conjunction with the moon, there is another one referring to the time of the day or the night at which they enter into conjunction. This classification is, however, connected with considerable difficulties. It is nowhere clearly stated on the conjunctions of what particular month this division is based; that such a statement ought to have been given, appears from the consideration that the periodical month during which the moon passes through all *nakshatras* comprises 27 days plus  $\frac{27}{67}$  days, and that there-

fore in the second, third, fourth, etc. months the times at which the moon enters into conjunction with the single *nakshatras* will all differ from the times of the first month. If for instance the moon at the beginning of the first month enters into conjunction with *Abhijit* in the early morning, she will at the beginning of the second month again enter into conjunction with it  $9\frac{27}{67}$  *muhūrtas* later, that is, in the afternoon and so on. Other

difficulties will appear from the following detailed reproduction of the *Sūryaprajñapti*'s account concerning this point. The *nakshatras* are either "*pūrvabhāga*" *i. e.*, such as enter into conjunction with the moon during the forenoon; or "*pāśchādbhāga*" *i. e.*, such as enter into conjunction during the afternoon or "*naktambhāga*" *i. e.*, such as enter into conjunction during the night or "*ubhayaabhāga*" which term will be explained further on. The *nakshatras* of the two first classes are the *samakshetras*, those of the third class the *apārdhakshetras*, those of the fourth class the *dyardhakshetras*. It certainly does not appear why the *samakshetras* should enter into conjunction with the moon during the day only and the *apārdhakshetras* during the night only; in reality there is no connexion between the extent of a *nakshatra* and the time when the moon enters into it. Let us, however, follow the detailed statements about each single *nakshatra*. The first aphorism of the *Sūryaprajñapti* appears to be "*Abhijit and Śravaṇa are pāśchādbhāga samakshetra*." To this the commentator rightly objects

that *Abhijit* is neither *samakshetra*, since it occupies only  $9\frac{27}{67}$  *muhūrtas* of the moon's periodical revolution, nor *pāśchādbhāga*, since at the beginning of the *yuga* the moon enters into conjunction with it in the early morning. At the same time he tries to obviate these objections by remarking that *Abhijit* is called *samakshetra* and *pāśchādbhāga*, because it is always connected with *Śravaṇa* to which both these attributes rightly belong, or that it may be called *pāśchādbhāga* with a view to conjunctions other than the

first one which may take place in the course of the yuga. But these both attempts at reconciling contradictions are very unsatisfactory. Howsoever this may be, the commentator goes on to explain that Abhijit and Śravaṇa, after having finished their conjunction with the moon, hand her over to Dhanishṭhā at evening (Abhijit-śravaṇo dve nakshatre sáyam-samayád árabhya ekám rátrim ekam cha sátirekam divasam chandrena sárdham yogam yuktaḥ etávantam kálam yogam yuktvá tad-anantaram yogam anu-parivartayataḥ átmanas chyávyataḥ yogam chánuparivartya sáyam divas-asya katitame paśchádbháge chandram dhanishṭháyáḥ samarpayataḥ). For this reason Dhanishṭhā also is paśchádbhága. After having been in conjunction with it for thirty muhúrtas the moon enters Śatabhishaj at the time when the stars have already become visible (parishphuṭanakshatramanḍa-lávaloke); Śatabhishaj is therefore naktambhága. How Śatabhishaj enters into conjunction at night, while exactly one ahorátra before Dhanishṭhā has been said to enter into conjunction during the afternoon, is not explained. Śatabhishaj being apárdhakshetra, the moon remains in conjunction with it for fifteen muhúrtas only and enters on the next morning into conjunction with Púrva-proshṭhapada, which being samakshetra remains in conjunction during one whole ahorátra. On the following morning the moon enters Uttara-proshṭhapada, which therefore would be púrvabhága. But the matter is looked at in a different light, Uttara-proshṭhapada is dvyardhakshetra, *i. e.*, remains in conjunction for 45 muhúrtas. If we now deduct from this duration the fifteen first muhúrtas and imagine Uttara-proshṭhapada to be samakshetra, the conjunction of the moon with it—looked at as samakshetra—may be said to take place at night and in consequence one—the real—conjunction taking place during the day and the other—the fictitious one—taking place at night the nakshatra is called ubhayabhága (idam kilottarabhádrapadákhyaṁ nakshatram uktaprakáreṇa prátaś chandrena saha yugam adhigachchhati, kevalam prathamán pañcha-daśa muhúrtán adhikán apaniya samakshetram kalpayitvá yadá yogaś chintyate tadá naktam api yogo 'stíty ubhayabhágam avaseyam). Uttara-bhádrapada remains in conjunction for one day, one night and again one day, on the evening of which the moon enters Revatí; Revatí is therefore paśchádbhága. After it has remained in conjunction for one nycthemeron the moon passes into Áśviní at evening time. Áśviní is therefore likewise paśchádbhága. From it the moon passes on the next evening into Bharaní, at the time, however, when the stars have become visible and night may be said to have begun; Bharaní is therefore naktambhága. Being at the same time apárdhakshetra, the moon leaves it on the next morning to enter Kṛittiká, which therefore is púrvabhága. On the next morning the moon enters Robiṇí which is dvyardhakshetra and, on account of that, ubhayabhága. Mṛgaśíras which she enters forty-five muhúrtas

later at evening is paśchādbhāga; Ārdra which enters into conjunction thirty muhūrtas later, at the time when the stars have come out, is naktambhāga; Punarvasu into which the moon enters on the next morning, being dvyardha, is ubhayabhāga. Pushya comes into conjunction on the evening of the following day and is paśchādbhāga; Āślesha thirty muhūrtas later, when the stars have come out, and is naktambhāga; Maghā and Pūrvaphalgunī into which the moon enters on the mornings of the two following days are pūrvabhāga; Uttara-phalgunī which comes into conjunction on the morning after that is ubhayabhāga, because it is dvyardhakshetra. Hasta and Chitrā enter into conjunction on the evenings of the two following days, before night has set in, and are therefore paśchādbhāga. Then again follows one naktambhāga nakshatra, viz., Svātī which enters into conjunction after nightfall, and upon this a dvyardhakshetra and consequently ubhayabhāga nakshatra, viz., Viśākhā. Then Anurādhā paśchādbhāga, after this Jyeshthā, apārdhakshetra and naktambhāga, remaining in conjunction from nightfall to the morning only; after this two samakshetra and pūrvabhāga nakshatras, viz., Mūla and Pūrvāshāḍhā. And finally Uttarāshāḍhā, which enters into conjunction on the morning, is, however, as a dvyardhakshetra, reckoned among the ubhayabhāga. It remains in conjunction for one nycthemeron and the following day, in whose evening the moon arrives at Abhijit whence she had started a (periodical) month ago.

The difficulties involved in all the preceding statements are increased by an assertion made in another chapter of the *Sūryaprajñapti*, viz., that no nakshatra always enters into conjunction with the moon at the same time of the day. This is indeed true, but it contradicts the preceding statements. It may be that this whole classification of the nakshatras according to the time of the day at which they enter into conjunction with the moon is a remainder of an earlier stage of knowledge, when the periodical month was supposed to last just twenty-seven days without an additional fraction, and when it therefore was possible to assign to each nakshatra one fixed hour at which it entered into conjunction during each periodical revolution of the moon. It is true that actual observation would speedily have shown the error of such an assumption, but this remark would apply to almost all hypotheses of the Indians of that period, and we may therefore suppose that in this point too the desire of systematizing prevailed during a certain period over the testimony of the eyes. Later on when the duration of the periodical month had become better known, the old classification lost its foundation entirely and ought to have been dropped; but through the force of custom it maintained its place and was justified some how, although not with the best success, as we have had occasion to observe above.

On the places of the nakshatras with regard to the moon we receive

the following information (X. 11). Six nakshatras, *viz.*, Mrigāsiras, Ardrā, Pushya, Āśleshā, Hasta, Mūla always stand to the south of the moon whenever she enters into conjunction with them. Twelve nakshatras—Abhijit, Śravaṇa, Dhanishṭhā, Satabhishaj, Pūrva-bhādrapadā, Uttara-bhādrapadā, Revatī, Āśvinī, Bharanī, Pūrva-phālgunī, Uttara-phālgunī, Svātī always stand to the north of the moon. Seven nakshatras—Kṛittikā, Rohiṇī, Punarvasu, Maghā, Chitrā, Viśākhā, Anurādhā—sometimes stand to the north of the moon entering into conjunction with them; sometimes, however, the moon enters into conjunction with them “pramardarūpeṇa” *viz.*, in such a manner that she passes right through them. To this class, the commentator remarks, some teachers holding an opinion different from that of the *Sūryaprajñapti* add also Jyeshṭhā. Two nakshatras, *viz.*, the two Āśhāḍhas stand at the time of conjunction either to the south of the moon or the latter passes right over them. Both these nakshatras consist of four stars each, two of which are situated inside, *viz.*, to the north of the fifteenth circle of the moon, while the two remaining ones are placed outside, *viz.*, to the south of the same circle. Now whenever the moon enters into conjunction with either of the two nakshatras, she passes right between the former pair of stars and may therefore be said to be in conjunction “pramardarūpeṇa.” Finally one nakshatra, *viz.*, Jyeshṭhā, always enters into conjunction with the moon pramardarūpeṇa. Regarding the relation of the nakshatras to the fifteen circles of the moon, the following statements are made. Eight circles always are “undeprived” (avirahitāni) of nakshatras. The twelve nakshatras mentioned above, beginning with Abhijit, are in the first circle; in the third circle there are Punarvasu and Maghā; in the sixth, Kṛittikā; in the seventh, Rohiṇī and Chitrā; in the eighth, Viśākhā; in the tenth, Anurādhā; in the eleventh, Jyeshṭhā; in the fifteenth, Mrigāsiras, Ardrā, Pushya, Āśleshā, Hasta, Mūla and the two Āśhāḍhas. For although the first six of the last mentioned class in reality move outside the fifteenth circle, they are—the commentator says—so near to it that they may be said to be in it. In order to form a right estimate of the meaning and the value of these statements, we must recall to our mind what has been remarked above about the *Sūryaprajñapti*’s theory of the moon’s motion. The moon is supposed to proceed alternately towards the south and the north in the same way as the sun does, following—as the *Sūryaprajñapti* seems to assume—the same path; that she in addition to the movement in declination has a movement in latitude, and that the points in which her orbit cuts the ecliptic are continually receding is ignored, theoretically at least, although it had been observed that the position of the moon with regard to some nakshatras is different at different times, that she sometimes passes on the north or south-side of a constellation and at other times moves right through it. Now comparing the particulars

with the information given about the position of the nakshatras in the Siddhántas, we find that the *Súryaprajñapti* agrees with the latter with regard to five out of the six nakshatras said always to stand south of the moon (*Mṛigaśíras*, *Ārdrá*, *Āśleshá*, *Hasta*, *Múla*), the latitude of all of them considerably exceeding the highest latitude the moon ever reaches. The case lies differently with regard to *Pushya*, which according to the Siddhántas lies in the ecliptic, so that it almost appears as if the *Pushya* of the *Súryaprajñapti* were an altogether different asterism. From among the twelve nakshatras said to stand always north of the moon ten (*Abhijit*, *Sṛavana*, *Sṛaviśthá*, *Púrva-Bhádrapadá*, *Uttara-Bhádrapadá*, *Aśviní*, *Bharaní*, *Púrva-Phálguní*, *Uttara-Phálguní*, *Svátí*) may be identified with the nakshatras of the Siddhántas, whose latitudes—excluding *Abhijit*—vary from  $9^{\circ}$  to about  $39^{\circ}$  north. Strange it is only that these nakshatras occupying a zone of about  $21^{\circ}$  breadth are said to be in one and the same circle of the moon, and still stranger that *Abhijit* too is classed among them, the latitude of the latter—if identical with the *Abhijit* of the Siddhántas—exceeding the latitudes of the other nakshatras, with which it is here thrown into one class, by about  $30^{\circ}$ . The *Satabhishaj* and *Revatí* of the Siddhántas are situated in and close to the ecliptic; here too therefore we might doubt if the *Súryaprajñapti* denotes by these two names the same stars as the Siddhántas. The remaining nakshatras may be identified with those of the Siddhántas, the latitude of none of the latter much exceeding the greatest latitude reached by the moon; a considerable margin must of course be allowed for the inaccuracy of the observations on which the statements of the *Súryaprajñapti* are based. Quite unfounded is the statement about the moon always passing right through *Jyeshthá*; it looks as if it had originated at some period when one of the moon's nodes had about the same longitude as that asterism.

The order of succession of the nakshatras is treated in X. 1. Of five different pratipattis regarding this point the author details only one, viz., that one according to which *Mṛittiká* stands first. The author of the *Súryaprajñapti* for his part calls *Abhijit* the first nakshatra, since according to his system at the beginning of the yuga on the day of the summer solstice early in the morning the moon which is full at that time stands in *Abhijit*. He therefore altogether abandons the principle, sometimes followed, according to which the enumeration of the nakshatras begins with that nakshatra in which the sun stands on the day of the vernal equinox; if he too had chosen this principle he would of course have begun his enumeration with *Aśviní*. It may here be mentioned by the way that the *Súryaprajñapti* does not occupy itself at all with the equinoxes, the name of which is not even mentioned in the whole work.

We now proceed to consider some specimens of the numerous cal-

culations, rules for the performance of which are contained in the Śūryaprajñapti itself as well as in a great number of old karaṇa-gāthās quoted by the commentator; remarking at once that the rules contained in the gāthās presuppose exactly the same system as the rules of the Śūryaprajñapti itself. A comparison of these calculations with those contained in the jyotiṣha-vedāṅga shows the extreme likeness and in many cases the complete identity of the two sets; a result which supplies another reason for looking on the Śūryaprajñapti as—in all essential points—a fair representative of Indian astronomy anterior to the period of the Siddhāntas. Several of these calculations have already been reproduced above incidentally; in the following a detailed account of the more important ones among those not yet touched upon will be given.

It appears that before the influence of Greek astronomy made itself felt in India, the division of the sphere into 27 or 28 nakṣatras was the only one employed and that no independent subdivisions of the nakṣatras were made use of. This want was, however, supplied by a simple transfer of the subdivisions of time to the nakṣatras. In accordance with this principle the Śūryaprajñapti divides the sphere into  $819 \frac{27}{67}$  muhūrtas, this being the duration of the periodical revolution of the moon, and allots to each nakṣatra a certain number of muhūrtas according to its greater or smaller extent. Fixed subdivisions of the muhūrta such as are commonly met in Indian astronomical works are, however, nowhere employed by the author of the Śūryaprajñapti; he apparently preferred to keep himself perfectly free from restrictions of this kind and uses throughout those fractions of the muhūrta only which were immediately suggested by the various calculations in hand. From the general nature of the yuga it is manifest at once which fractions will present themselves most readily; they are sixty-seconds and sixty-sevenths ( $62 =$  number of synodical months in a yuga,  $67 =$  number of periodical months) and, whenever lunar months of both kinds enter into the calculations, sixty-sevenths of sixty-seconds.

One of the most important rules is that which teaches how to find the place of the moon on any parvan. In the following the details of the calculation furnished by the commentator will be stated in extenso, so that at least one complete specimen of computations of this kind may be exhibited.—If we wish to devise a rule for calculating the place of the moon in the circle of the nakṣatras at any parvan, we must at first find the constant quantity—the dhruvarāśi—entering as a multiplicand into all calculations of this kind. This in our case is clearly the space passed through by the moon during the lunar month, or more simply, because entire revolutions which bring the moon back to the same place can be neglected, the excess of the lunar synodical month above the periodical

month. From what is known about the general constitution of the yuga this quantity is of course readily found to be equal to  $66 + \frac{5}{62} +$

$\frac{1}{62 \times 67}$ . The commentator calculates this quantity as follows. If the

sun performs during 124 parvans five complete revolutions, how much does he perform during 2 parvans (= one synodical month); answer:  $\frac{5 \times 2}{124} =$

$\frac{5}{62}$  rev. This therefore is the excess of the synodical month above the

periodical one. In order that the division can be carried out, the  $\frac{5}{62}$  rev.

are turned into nakshatras by multiplying them by  $\frac{1830}{67}$  (i. e. by  $27 \frac{21}{67}$ ,

the duration in ahorátras of the periodical month or, if we like, the extent of the nakshatras; 27 entire nakshatras plus the fractional nakshatra Abhijit). Result of the multiplication  $\frac{9150}{4154}$ . Again—in order to

turn the days or nakshatras into muhúrtas—the numerator is multiplied by 30. Result =  $\frac{274500}{4154}$ . This division being performed gives as result

66 muhúrtas. The remainder 336 is multiplied by 62 and the product again divided by 4154. Result =  $\frac{5}{62}$  muhúrtas. The remainder—62—

should again be multiplied by 67 (the fractions employed being throughout sixty-seconds and sixty-sevenths) and divided by 4154; but 4154 being itself =  $62 \times 67$ , it is seen at once that the result is 1. Thus the

whole quantity is  $66 + \frac{5}{62} + \frac{1}{62 \times 67}$  muhúrtas. If now the place of

the moon at any amávasyá or pūrṇamásí is wanted, the above quantity has to be multiplied by the number of the parvan; for instance, by one if the moon's place at the first full moon after the beginning of the yuga is wanted. The product shows how far the moon at the time has advanced beyond the place she had occupied at the beginning of the yuga, if full moons are concerned, or beyond the place she had occupied at the new moon preceding the beginning of the yuga, if new moons are concerned, (the new moon immediately antecedent to the beginning of the yuga having been selected as starting-point for all calculations concerning new moons). So far the place of the moon is expressed in muhúrtas only; now in order to find from these the nakshatra in which the moon stands at the time, we should

have to deduct from the muhúrtas found the extent of all the nakshatras through which the moon has passed one after the other, until the sum would be exhausted. Thus, for instance, if we wanted to find the place of the moon at the third new moon after the beginning of the yuga, the constant quantity  $66 + \frac{5}{62} + \frac{1}{62 \times 67}$  would have to be multiplied by 3, so that we should have  $198 + \frac{15}{62} + \frac{3}{62 \times 67}$  muhúrtas. Now the moon standing at the new moon preceding the beginning of the yuga in Punarvasu, of which she has still to pass through  $22 \frac{46}{62}$  muhúrtas, we should have to deduct this last quantity from  $123 + \frac{10}{62} + \frac{2}{62 \times 67}$ ; from the remainder we should have to deduct 30 muhúrtas (the extent of Pushya); from the remainder again 15 (Āśleshá); again from the remainder 30 (Maghá), and so on, until in the end the fact of the remainder being smaller than the next following nakshatra would show that new moon takes place in that nakshatra.—In order, however, to shorten this somewhat lengthy process, certain subtrahends are formed out of the sum of the extent of several nakshatras, which materially alleviate the work by substituting one subtraction for a number of subtractions. Thus with reference to new moon—the subtrahend (śodhanaka) for Uttara-phálguni is said to be 172, for Viśákhá 292, for Uttara-áshádhá 442; i. e., if from the product of the constant quantity by the number of the new moon 172 can be deducted, we see at once that the moon has advanced beyond Uttara-ashádhá; if 292 can be deducted, she has passed the limits of Viśákhá and so on. The subtrahends are not carried on from Punarvasu beyond Uttara-áshádhá, but make a fresh start from Abhijit, apparently in order to make them available for the calculation of the places of the full moons too. Thus the subtrahend for Abhijit is 9 and a fraction, of Uttara-bhádrapadá 159, of Rohini 309, of Punarvasu 399, of Uttara-phálguni 549, of Viśákhá 669, of Múla 744, of Uttara-ashádhá 819.

The places in which the different full moons of the yuga occur are found by an exactly similar proceeding; only all calculations have to start not from Punarvasu, but from the beginning of Abhijit where the first full moon which coincides with the beginning of the yuga takes place. The text enumerates the places of all full moons and new moons of the yuga at length, carrying in each case the calculations down to sixty-sevenths of sixty-seconds of muhúrtas. It is needless to reproduce these lists here in extenso, as any place wanted can be calculated with ease from the general rule given above.

The same result, *viz.*, to find the place of the moon on a given parvan is obtained by following another rule contained in some gāthās quoted by the commentator. Their purport is as follows. Multiply sixty-seven (the number of periodical revolutions which the moon makes during one yuga) by the number of the parvan the place of which you wish to find and divide this product by one hundred and twenty-four (the number of parvans of one yuga). The quotient shows the number of whole revolutions the moon has accomplished at the time of the parvan. The remainder is to be multiplied by 1830 (*viz.*, 1830 sixty-sevenths which is the number of nycthemera of one periodical month) or more simply by 915 (reducing 1830 as well as the denominator *viz.*, 124 by two). From the product (remainder multiplied by 915) deduct 1302, which is that part of a whole revolution which is occupied by Abhijit (Abhijit occupies  $\frac{21}{67}$  days, but as this amount is to be deducted from the numerator of a fraction the denominator of which is 62, 21 is to be multiplied by 62; product = 1302). The portion of Abhijit, from which the moon's revolutions begin, is deducted at the outset, because it is greatly smaller than the portion of all other nakshatras and would disturb all average calculations. After it has been deducted the remainder is divided by  $67 \times 62$ ; the quotient shows the number of nakshatras beginning from Śravaṇa which the moon has passed through, in addition to the complete revolutions. The remainder is again multiplied by thirty, the product divided by 62; the quotient shows the number of muhūrtas during which the moon has been in the nakshatra in which she is at the time. And so on down to small fractions of nakshatras. The following is an example. Wanted the place of the moon at the end of the second parvan. Multiply 67 by 2; divide the product by 124. The quotient (1) indicates that the moon has performed one complete periodical revolution. The remainder (10) is multiplied by 1830 or more simply by 915 (see above); from the product (9150) the portion of Abhijit (1302) is deducted. The remainder (7848) is divided by  $67 \times 62 = 4154$ ; the quotient (1) shows that after Abhijit the moon has passed through one complete nakshatra, *viz.*, Śravaṇa. The remainder (3694) is multiplied by 30; the product (110820) again divided by 4154; the quotient (26) shows that the moon has moreover passed through 26 muhūrtas of Śravishthā. By carrying on this calculation we arrive at the result that at the end of the second parvan the moon stands in Śravishthā, of which she has passed through  $26 + \frac{42}{62} + \frac{2}{62 \times 67}$  muhūrtas.

Analogous calculations are made for the sun too. For instance, in what circle does the sun move at the time of each parvan? The rule here is very simple. Multiply the number of the parvan by fifteen (the number

of tithis of one parvan) and from the product deduct the number of avamārātras (excessive lunar days) which occur during the period in question. If the parvan occurs during the first ayana of the sun, the remainder immediately indicates the number of the solar circle which is in fact the same as the number of the civil day on which the parvan happens; if the parvan takes place during one of the other nine ayanas, the remainder must at first be divided by 183 (number of circles described by the sun during one ayana); etc. The rule is simple and needs no illustration.

The rule for finding the nakshatra in which the sun stands at the time of each parvan (the *sūryanakshatra*) is quite analogous to the rule given above for the moon. The sun makes in one yuga five complete revolutions, in one parvan  $\frac{5}{124}$  revolutions. This quantity is to be multiplied by the number of the parvan and then we have as above to descend by continued multiplication and division to nakshatras, sixty-second parts of nakshatras and sixty-seventh parts of sixty-second parts. Instead of deducting the portion belonging to Abhijit at the beginning of which the moon stands on the first day of the yuga, we have to deduct that part of Pushya which the sun has not yet passed through at the beginning of the yuga; it amounts to  $\frac{44}{67}$  of a nychthemeron. All the remainder of the calculation is the same as in the moon's case and illustrative examples are therefore not wanted.

Besides there is another and considerably simpler method for finding the sun's place at the end of a parvan; it is likewise contained in some old *karana-gāthās*. The rule again assumes a "dhruvarāśi", a constant quantity, to be used in all calculations of this kind. This quantity is  $33 + \frac{2}{62}$

+  $\frac{34}{62 \times 67}$  muhūrtas; for if we divide the whole circle of the nakshatras into  $819 \frac{27}{67}$  muhūrtas (which is the time occupied by a complete revolution

of the moon) the above amount expresses the way the sun accomplishes during one parvan. This quantity has therefore to be multiplied by the number of the parvan required, and by subtracting from the product at first the  $19 + \frac{43}{62} + \frac{33}{67 \times 62}$  muhūrtas belonging to Pushya, after that the 15 muhūrtas of Āśleshā, after that the 30 muhūrtas of Maghā etc., we find in the end the nakshatra in which the sun completes the parvan. In order to facilitate these somewhat lengthy subtractions, the muhūrtas of a certain number of nakshatras are again added and presented in a tabular form. So for instance 139 muhūrtas ( $19 + 15 + 30 + 30 + 45$ ) lead us up to

the end of Uttara-phālgunī, and if therefore the product found in the manner shown above exceeds 139, we may at once subtract 139 instead of performing five separate subtractions and know that the sun has at the time passed beyond Uttara-phālgunī. The procedure is analogous to the one described above and needs no further illustration.

For finding how many seasons have elapsed on a certain tithi, the commentator quotes some gāthās of the old teachers. The rule they contain is as follows. Multiply the number of the parvans which have elapsed since the beginning of the yuga by fifteen, and add to the result the number of tithis which have elapsed in addition to the complete parvans; deduct from this sum its sixty-second part; multiply the remainder by two and add to the product sixty-one; divide the result by one hundred and twenty-two; the quotient shows the number of seasons elapsed (which when exceeding six will have to be divided by six, since so many seasons constitute a solar year); the remainder divided by two shows the number of the current day of the current season. This rule seems not very well expressed, although it may be interpreted into a consistent sense. At first it must be remembered that the yuga does not begin with the beginning of a season, but with the month śrāvaṇa, while the current season—the rainy season—has begun a month earlier with āśhāḍha. The calculation would then, strictly expressed, be as follows. Take the number of parvans which have elapsed since the beginning of the yuga, add to it the tithis which have elapsed of the current parvan and add again to this sum  $30\frac{1}{2}$  tithis (the tithis of āśhāḍha plus half a tithi of the month preceding āśhāḍha) and deduct from this sum its sixty-second part, *viz.*, the so-called avamarātras, *i. e.*, the lunar days in excess of the natural days (according to the *Sūryaprajñapti*'s system each sixty-second tithi is an avamarātra). The remainder of the calculation needs no explanation; the formula enjoins the addition of 61 instead of  $30\frac{1}{2}$  and division by 122 instead of 61 (the number of days of a season) in order to get rid of the fractional part of  $30\frac{1}{2}$ .

In order to find the number of the parvan during which an avamarātra occurs and at the same time the tithi itself which becomes avamarātra, the following rule is given. The question is assumed to be proposed in the following manner. In what parvan does the second tithi terminate while the first tithi has become avamarātra, or in what parvan does the third tithi terminate while the second is avamarātra? and so on, (*kasmin parvaṇi pratipady avamarātrībhūtāyām dvitīyā samāptim upayāti, etc.*) The answer is: if the number of the tithi which becomes avamarātra is an odd one, one has to be added to it and the sum to be multiplied by two; the result shows the number of parvans elapsed before the first tithi becomes avamarātra. If the number is an even one, one is added to it, the sum multiplied by two, and to the product thirty-one is added; the result again shows the

number of parvans elapsed. Thus for instance if it is asked : when does the first tithi become avamarātra ? add one to one (number of the tithi) result two ; this multiplied by two gives four ; therefore pratipad is avamarātra in the fifth parvan, after four parvans have elapsed. Or again it may be asked : when does the second tithi become avamarātra ? add one to two ; result three ; this multiplied by two gives six, to which thirty-one are added. The result—thirty-seven—shows that in the thirty-eighth parvan the second tithi is avamarātra. Thus all the avamarātras for the first half of the yuga are found and the same numbers recur during the second half. The rationale of this rule is obvious.

A simple rule is given for finding the tithis on which the āvrittis of the sun, *i. e.*, the solstices take place. Multiply the number of the solstice whose date you wish to know by 183 and add to the result three plus the number of the solstice ; divide this sum by fifteen ; the quotient shows the number of parvans elapsed, the remainder the number of the tithi of the current parvan. This rule—being based on the relation of tithis to sāvana days needs no explanation. The following list for the whole yuga results from these calculations.

1st Summer solstice ( = 10th solstice of the preceding yuga).

|                           |                            |
|---------------------------|----------------------------|
|                           | 1st dark half of śrāvāṇa.  |
| 1st Winter solstice,..... | 7th " " " māgha.           |
| 2nd S. S., .....          | 13th " " " śrāvāṇa.        |
| 2nd W. S., ..             | 4th light half of māgha.   |
| 3rd S. S.,.....           | 10th " " " śrāvāṇa         |
| 3rd W. S , .....          | 1st dark half of māgha.    |
| 4th S. S.,.....           | 7th " " " śrāvāṇa.         |
| 4th W. S., .....          | 13th " " " māgha.          |
| 5th S. S.,.....           | 4th light half of śrāvāṇa. |
| 5th W. S., .....          | 10th " " " māgha.          |

The places which the sun occupies in the circle of the nakshatras at the time of the solstices have been mentioned before ; the places of the moon at the same periods can of course be easily calculated when it is remembered that at the beginning of the yuga the moon just enters Abhijit. It is unnecessary to reproduce here the rule given for that purpose ; it may only be mentioned that the  $\frac{7}{10}$  of a sidereal revolution which the moon performs during one solar ayāna in excess of six complete revolutions constitute the "dhruva rāśi" for our case. The Śūryaprajñapti likewise states the places in which the lunar āvrittis take place ; from the circumstance that at the beginning of a yuga the moon is full in the first point of Abhijit and at the same time commences her progress towards the north, it follows

that her next progress towards the south takes place exactly on the same spot on which the sun was standing at the beginning of the yuga. At all following lunar ávrittis the places of the two first ones of course recur.

Incidentally another rule is mentioned which certainly was of frequent application, *viz.*, how to find on what natural day and at what moment of time during that day a given tithi terminates. The rule which is contained in an old *karapa-gáthá* is of course very simple. Add together all tithis which have elapsed from the beginning of the yuga up to and including the tithi in question; divide this sum by sixty-two; multiply the remainder by sixty-one and divide again by sixty-two. The remainder is then the wanted quantity. The first division by sixty-two has the purpose to shew by its quotient—the number of complete *avamarátras* elapsed since the beginning of the yuga; this number has therefore to be deducted from the number of tithis elapsed. The remainder of the above division shows the number of tithis which have elapsed since the occurrence of the last *avamarátra*; to find by how much they remain behind the same number of natural days, they are multiplied by 61 and divided by 62 (61 natural days = 62 tithis); the remainder then indicates how many sixty-second parts of the current natural day have elapsed at the moment when the tithi in question terminates.

Another old rule has the purpose of teaching how to find the number of *muhúrtas* which have elapsed on the *parvan*-day at the moment when the new *parvan* begins. When the number of the *parvan* divided by four yields one as remainder (in which case it is called *kaly-oja*) we must add ninety-three to it; if divided by four it yields two (in which case it is called *dvápara-yugma*), we add sixty-two to it; if it yields three (*tretá-oja*), we add thirty-two; if there is no remainder (*kṛita-yugma*), we add nothing. The sum which we obtain in each case is halved, then multiplied by thirty, finally divided by sixty-two. The quotient shows the number of *muhúrtas* of the *parvan*-day which have elapsed at the moment when the new *parvan* begins. The rationale of this rather ingenious rule is as follows. The duration of one *parvan* is  $1\frac{94}{124}$  days. The first *parvan* therefore terminates when  $\frac{94}{124}$  of the day =  $\frac{94 \times 30}{124} = \frac{47 \times 30}{62}$  *muhúrtas* have elapsed. The number 94 may be obtained by adding 93 to 1, the number of the first *parvan*. The second *parvan* ends  $29\frac{64}{124}$  days after the beginning of the yuga; 64 equals  $62 + 2$ , the number of the second *parvan*. The third *parvan* terminates  $44\frac{34}{124}$  days after the beginning of the yuga; 34

equals  $31 + 3$ , the number of the third parvan. The fourth parvan terminates  $59 \frac{4}{124}$  days after the beginning of the yuga ; 4 without any addition

is the number of the parvan. The fifth parvan again terminates  $73 \frac{98}{124}$  days after the beginning of the yuga ; 98 is equal to  $93 + 5$ , the number of the parvan. And so on through the whole yuga.

The above examples fairly represent the more important rules contained in the Śūryaprajñapti. Now it will be apparent to every one who is to some extent familiar with the Jyotisha-vedāṅga\* that the rules contained in the, as yet partly unexplained, verses of the latter refer to calculations exactly analogous to those contained in the Śūryaprajñapti and the old gāthās quoted by the commentator.

From this it might be concluded that it is now easy for us to explain whatever has up to the present remained unexplained in the Vedāṅga, possessing as we doubtless do a clear insight into the general nature of the calculations for which it furnishes rules. But close as the connexion between the contents of the two treatises manifestly is, there are two reasons which preclude the direct application of the rules of the Śūryaprajñapti to the elucidation of the Vedāṅga. In the first place the Vedāṅga divides the sphere into twenty-seven nakshatras only and, as far as has been ascertained up to the present, these twenty-seven nakshatras are considered to be of equal extent ; while as we have seen above the Śūryaprajñapti throughout employs the division of the sphere into twenty-eight nakshatras of unequal extent. In the second place the starting point for all calculations (*viz.*, the places of the winter and summer solstice) is not the same in the two works. The consequence of these two fundamental discrepancies is that although the questions treated of are essentially the same and although the modes of calculation are strictly analogous the results arrived at in the two treatises necessarily differ in all cases, that for instance the place of a certain full or new moon during the quinquennial yuga can never be the same according to the Śūryaprajñapti as it is according to the Vedāṅga, etc. Nevertheless it is highly probable that somebody who should apply himself to the study of the obscure portions of the Vedāṅga after having made himself thoroughly conversant with the contents and methods of the Śūryapra-

\* Since the publication of the paper on the Jyotisha-vedāṅga in the 46th volume of this Journal, the writer has received some very important contributions to the explanation of the Vedāṅga from Dr. H. Oldenberg, the well-known editor of the Vinaya-piṭakam, who working altogether independently had succeeded in explaining a number of hitherto obscure rules. The writer intends to revert to the Vedāṅga before long and will then avail himself of the new results most kindly placed at his disposal by Dr. Oldenberg.

jñapti, would succeed in solving some more of the riddles presented to us by the former work.

It must be remembered that there is no indissoluble connexion between that part of the system of the *Sūryaprajñapti*, which might be called the chronometrical one, *viz.*, the doctrine of the quinquennial yuga and its various subdivisions and that part which propounds the theories accounting for the apparent motions of the sun and the moon; it might therefore be that the *Vedāṅga* agrees with the *Sūryaprajñapti* only in the former point and follows a different course with regard to the latter. There occurs, however, one expression in the *Vedāṅga* which makes it appear likely that the analogy between the two books extends to the second point also, *viz.*, the “*sūryamaṇḍalāni*” mentioned in verse 22.

अतीतपूर्वभागैः गोघयेद् द्विगुणं तिथिम् ।

तेषु सपञ्चलभागेषु तिथिनिष्ठां गतो रविः ॥

It certainly looks as if by these “sun circles” in which the sun is said to be at the end of a tithi, we had to understand daily circles of the same kind as those which, according to the *Sūryaprajñapti*, the sun describes round Mount Meru.

A few words may here be added on the principal feature common to the cosmological systems of the *Purāṇas*, Buddhists and Jains, *viz.*, the doctrine of sun, moon and constellations revolving round Mount Meru. In order rightly to judge of these conceptions we must remember that they arose at a time when the idea of the sphericity of the earth had not yet presented itself to the Indian mind, at a time (—if we may assume that the *Purāṇic*-Buddhistic cosmological system is not later than the period of the rising of Buddhism—) when this then truly revolutionary idea first suggested itself to the early Greek philosophers. And if we carry our thoughts back to that early stage of the development of scientific ideas and try to realize the conceptions which then were most likely to present themselves to enquirers, the old Indian system will lose much of its apparent strangeness and arbitrariness. How indeed could men ignorant of the fact that the earth is a sphere freely suspended in space explain to themselves the continually recurring rising and setting of the heavenly bodies? what could their ideas be regarding the place to which sun and moon went after their setting, and the path which unseen by man they followed so as to return to the point of their rising? Certainly the difficulty was a very great one to those as well who had some vague notion about the earth extending in all directions to an unlimited distance as to those who imagined it to be bounded at a certain distance by a solid firmament surrounding and shutting it in on all sides. We may recall, as one of the fancies to which the difficulty of this question gave rise, the old poetical idea, pre-

served, for instance, in a beautiful fragment of Stesichorus, of Helios when he has reached Okeanos in the west embarking in a golden cup which carries him during the night round half the earth back to the east whence he rises again. Under these circumstances we must admit that the old Indian idea of the constitution of the world, according to which the rising and setting of sun, moon and stars is only apparent, cannot by any means be called an unnatural one, and it is interesting to consider the counterparts it finds among what is known of the opinions of the oldest Greek philosophers.\* So it is reported of Anaximenes that he supposed the sun not to descend below the earth, but to describe circles above it and to pass during the night behind high mountains situated in the north; an exact parallel to the Indian conception. Of Xenophanes we hear that he declared the sun, moon and stars to be only accumulations of burning vapour, fiery clouds kindling and extinguishing themselves by turns, that these clouds move in reality in straight lines and only appear to us to rise and to set in consequence of their varying distance, in the same way as the common clouds seem to rise from the horizon when they first become visible to us and seem to sink under the horizon when they pass out of our field of vision. These opinions too find their exact counterpart in the *Súryaprajñapti* and kindred works where the rising and setting of the heavenly bodies is declared to be an appearance caused by their consecutive approaching and receding, and where their movement is said to take place not indeed in a straight line but at any rate in a plane parallel to the plane of the earth. The first mentioned opinion of Xenophanes about the constitution of the heavenly bodies finds its analogon in one of the different *pratipattis*, mentioned in the *Súryaprajñapti*, according to which the sun is nothing but a "*kiraṇasaṃghāta*," an accumulation of rays forming itself every morning in the east and dissolving itself in the evening in the west. The cognate views held by Heraclitus concerning the nature of the sun are well known. Of Xenophanes it is further reported that he supposed different climes and zones of the earth, far distant from each other, to have different suns and moons; which is another striking parallel to the view held by the Jainas with reference to the different suns, moons and stars illuminating the different concentric *dvīpas* of which the earth consists. In both cases the assumption of the rising and setting of the heavenly bodies being an appearance, caused by their becoming visible and invisible in turns when having approached us or receded from us by a certain amount, seems to have led to the conclusion that the light of the one sun and the one moon appearing to us cannot illumine the whole vast earth, since it only reaches to a certain limited

\* For the particulars mentioned in the following : comp. Mullach's collection of the fragments of the Greek philosophers, Zeller's history of Greek philosophy, Lewis's historical survey of the Astronomy of the Ancients.

distance.—On the other hand it is true enough that, notwithstanding these similarities of Indian and Greek ideas, books of the nature of the *Sūryaprajñapti* serve clearly to show the difference of the mental tendencies of the two nations. Both in an early age conceived plausible theories, in reality devoid of foundation, by which they tried to account for puzzling phenomena ; but while the Greeks controlled their theories by means of continued observation of the phenomena themselves and replaced them by new ones, as soon as they perceived that the two were not in harmony, the Hindus religiously preserved the generalisations hastily formed at an early period, and instead of attempting to rectify them, proceeded to deduce from them all kinds of imaginary consequences. The absurdity of systems of the nature of the *Jaina* system lies not in the leading conceptions—these can as a rule be accounted for in a more or less satisfactory manner—but in the minute detail into which the followers of the system have without scruple and hesitation worked it out.

Before this paper is brought to a conclusion, the writer wishes to draw attention to the—in his opinion very striking—resemblance which the cosmological and astronomical conceptions, contained in an old Chinese book, bear to the early Indian ideas on the same subject, more particularly to the *Jaina* system as expounded in the *Sūryaprajñapti*. The Chinese book alluded to is the *Tcheou-Pei* of which a complete translation was published for the first time by Edward Biot in the *Journal Asiatique* for 1841, pp. 592—639. It consists of two parts of different ages ; the first part which apparently is of considerable antiquity, has been known since the time of Gaubil, who inserted a translation of it into his history of Chinese astronomy, published in the *Lettres édifiantes* ; that part, as is well known, shows that the ancient Chinese were acquainted with the theorem about the square of the hypotenuse of a right-angled triangle. The second and more recent part, which E. Biot thinks cannot be later than the end of the second century of our era, contains a sort of cosmological and astronomical system, and here the traits of resemblance alluded to above are to be found. As the arrangement of topics in the *Tcheou-Pei* is by no means systematic, so that it is not easy to form a clear conception of the essential points, a short abstract of the work, as far as it lends itself to a comparison with the *Jaina* system, is given in the following.

According to the *Tcheou-Pei* the sun describes during the course of the year a number of concentric circles of varying diameter round the pole of the sky. On the day of the summer solstice the diameter of this circle is smallest ; it then increases during the following months, up to the day of the winter solstice when it reaches its maximum. Beginning from this day the solar circles again decrease, until on the day of the next summer

solstice they have reached the original minimum. On the day of the winter solstice the diameter of the solar circle amounts to 476,000 li (the li is a certain Chinese measure of length); its circumference to  $3 \times 476,000 = 1,428,000$  li. The corresponding numbers for the circle, described on the day of the summer solstice, are 238,000 and 714,000. Between the innermost and the outermost circle there lie five other circles, which the sun describes in the months intervening between the two solstices, so that there are altogether seven circles; the six intervals between these are said to correspond to the months of the year ( $2 \times 6 = 12$ ). So it appears that the Teheou-Pei assumes separate solar circles for each month only, not for each day. Each circle is at the distance of  $19,833\frac{1}{3}$  li from the two neighbouring circles.

The terrestrial place for which all the calculations of the Teheou-pei are made is said to have such a situation that it is distant 16,000 li from the spot lying perpendicularly under the sun on the day of the summer solstice and 135,000 li from the spot lying perpendicularly under the sun on the day of the winter solstice; the distance of the place of observation from the pole, *i. e.*, the spot at the centre of the earth which lies perpendicularly under the celestial pole, is said to amount to 103,000 li. Round the terrestrial pole there extends a circle of 11,500 li radius, which is the terrestrial counterpart of the circle described by the polar star round the celestial pole. The light of the sun extends 167,000 li in each direction, so that on the day of the winter solstice when the sun moves in the exterior circle it extends at midday only 32,000 li beyond the place of observation and so does not reach up to the polar circle. On the days of the two equinoxes when the sun is moving in the fourth circle—the diameter of which amounts to 357,000 li—the rays of the sun just reach up to the polar circle. On the day of the summer solstice when the sun moves in the interior circle his rays reach beyond the pole to the extent of 48,000 li, so that then the whole polar circle is continually illuminated. When the sun in his daily revolution has reached the extreme north point, it is midday in the northern region and midnight in the southern region; when he has reached the east point, it is midday in the eastern, midnight in the western region; when he has reached the south point, it is midday in the southern, midnight in the northern region; when he has reached the west point, it is midday in the western, midnight in the eastern region. As the light of the sun always reaches 167,000 li each way, we must add  $2 \times 167,000$  to the diameter of the circle, described on the day of the winter solstice, in order to obtain the diameter of the circle representing the outmost limit reached by the rays of the sun; the diameter of this circle is therefore 810,000 li.

On the day of the winter solstice the space illuminated by the sun .

stands to the space not reached by his rays in the relation of three to nine ; this proportion is to be reversed for the day of the summer solstice. The day of the winter solstice is the shortest during the year ; the day of the summer solstice the longest. On the day of the winter solstice the shadow of the gnomon is 13·5 feet long ; beginning from this day it goes on diminishing by equal quantities during equal spaces of time up to the day of the summer solstice when its length is reduced to 1·6 feet. It then increases again in the same uniform manner up to the day of the next winter solstice.

The circumference of the sky is divided into twenty-eight stellar divisions of unequal extent, through the circle of which sun and moon are performing their revolutions. Kien-nieou is the asterism in which the sun stands at the winter solstice ; Leou the asterism of the vernal equinox etc. A procedure is taught how to find the place of the sun at any time. The whole circle of the asterisms is divided into  $365\frac{1}{4}$  degrees corresponding to the number of the days of the year. A year is the period which the sun requires for returning to the same star from which he had set out. The meeting of sun and moon constitutes a month. A period of nineteen years of  $365\frac{1}{4}$  days each contains 235 lunations. Arithmetical rules are given how to find the place of the moon at the beginning of each year etc.

The Tcheou-pei contains some additional matter about observations of the polar star etc., but by far the greater part of the topics it treats have been touched in the above summary. The similarity of this system and the old Indian systems particularly, as far as some details are concerned, the Jaina system is obvious. The same supposition is made use of in both to account for the alternating progress of the sun towards the north and the south. In the Jaina system the sun revolves round Mount Meru, in the Chinese system, to which the idea of a central mountain seems to be foreign, round the pole of the sky ; Mount Meru finds, however, a curious counterpart in the Chinese polar circle, the projection of the circle described by the polar star. Both systems state the dimensions of the circles described by the sun ; both state in figures the extent to which the rays of the sun reach. Both hold the same opinion about the alternation of day and night in the different parts of the earth. Both are interested in finding out what places sun and moon occupy in the circle of the nakshatras. Both teach the increase of the shadow by an equal quantity in each month. On the other hand there are important points in which the two systems differ. The Chinese appear from comparatively ancient times to have had a knowledge of the fact that the approximate duration of the solar year amounts to  $365\frac{1}{4}$  years and that a period of nineteen years comprises 325 lunations. This of course makes the system of the Tcheou-pei to differ from the Jaina system in all those details which depend on the fundamen-

tal period and the advantage is of course altogether on the side of the Chinese. On the whole the Tcheou-pei is much superior to works of the stamp of the Śūryaprajñapti, as in midst of all the fantastical and unfounded ideas it contains there are found some positive elements, observations of stars which admit of control etc., features altogether absent in the Śūryaprajñapti. But in spite of these points of difference the similarities of the two works remain striking, especially if we take as one member of the comparison not the Śūryaprajñapti itself but some hypothetical older work of the same class, less elevate and more moderate in the statement of dimensions, figures etc. That such works if not existent at present must have existed at same earlier period is manifest from the remarks the Śūryaprajñapti in many places makes about the opinions of other teachers, several of which have been extracted above. That two different chronological periods, the quinquennial yuga and so called Metanic cycle, from the foundation of the two systems does after all not interfere very much with their similarity. We might imagine the Jainas adopting the more correct cycle of nineteen years instead of the quinquennial one and work out all the new details necessitated by such a change, calculate all the places of moon and full moon during nineteen years instead of five etc., nevertheless the new system would immediately suggest the idea of the old one. An essential feature in the resemblance of the Chinese and the Hindu system is more over the circumstance of both limiting themselves to the treatment of a certain number of topics. The following paragraph of the Tcheou-pei (p. 603) which shortly states the questions to be treated in the work, might with hardly any change be taken as a summary of the contents of the Śūryaprajñapti.

“I have heard people speak of the knowledge of the great man. I have heard it said that he knows the height and the size of the sun, the extent which his light illuminates, the quantity by which he moves in the course of one day, the quantity by which he recedes and approaches, the extent which the eye of man embraces, the position of the four extreme (cardinal) points, the divisions of the stars arranged in order, the breadth and length of the sky and the earth.”

The question whether the similarity of the two systems justifies us in assuming a historical connexion between the two or would be an interesting one, but cannot be treated in this place, especially as its solution could only be attempted together with the solution of a number of cognate problems.



*Coins supplementary to Thomas' "Chronicles of the Pathán kings of Delhi."*—By CHAS. J. RODGERS. (With a Plate.)

Steady research is always followed by constant results. These results are as a rule insignificant discoveries which are individually small, but collectively they all go to swell the sum of human knowledge. In my last small supplement to Thomas' "Chronicles of the Pathán kings of Delhi" I promised to give some additions which I had then in hand. But as I went on with two other papers and my researches for them, I found that incidentally my matter for the second supplement grew more interesting, and at last I found to my surprise that I had more coins in hand than would fill two plates; so I began to draw at once and simultaneously to put away for a third supplement all coins for which I could not now find a place. Strange to say just as I had made up my mind about these plates a find of about 500 coins of five Ghazni kings, all struck at Lahore, came to hand, some quite new and unpublished, and after that a batch of silver coins of Ala-uddin Khwárizmí of whose coins I gave three new types in my first supplement and of whose I give one great beauty in my present paper. These silver coins were struck at *Ghazní* and *Furwán* or as Thomas calls it '*Perwán*.' He gives no drawings of them and only alludes to them as giving us the mint of *Perwán*. These *Ghazní* kings' and the *Khwárizmí* king's coins must stand over for the present. I scarcely dare make a promise about them. About a year ago I came across a find of *Ghazní* coins, in number about 500, and up till now I have had no time to work at them and say what was in them, although there were several novelties of historic value. As I personally go to the bazars I see for myself what comes into them. And when I see what comes into them and what finds a lodgement in our museums, I am astonished and dumb-founded to think that coins of whose existence we are unaware are daily being brought in from the villages and fields and ruins which abound here and there in the country and are simply handed over to the smelting pot as common silver,—bullion in fact which is purchased at a little less than its intrinsic value. And all this, while there is in India no Imperial Cabinet of Coins and no one appointed to collect for it and arrange it and make it a thing worthy of the historical associations, India as an Empire and as a collection of ancient kingdoms and states, possesses. India is a continent: but it is too poor to possess one Imperial Cabinet of coins which would serve as a metallic record of past emperors and rulers; past glories and shames, in fact, which would be a history of the past in metal manuscripts. With the present rage for melting down

everything it is high time something were attempted. Our only relics will soon be empty, worn out, burnt up smelting pots.

In the present supplement the coins I give are chiefly varieties of coins already known. The inscriptions are sometimes longer than those given in Thomas: sometimes they correct his readings; sometimes the coins reveal new mints, sometimes they are quite new types of coins.

Plate I, No. 1. Obv. *Tij ud daulat Khusrau Malik*.

Rev. Bull with new mark on its *jhul*.

This coin is quite a new type of Khusrau Malik's coins.

No. 2. Obv. (*As sultán ul*) *Azim Tij ud Daulat Khusrau Malik*.

Rev. Bull with new mark on its *jhul*.

No. 3. Obv. (*Us sultán al*) *Azim Rukn ud dunyá wa ud Dín Fíroz (Sháh)*.

Rev. Remains of a horseman and his steed.

Thomas gives three coins belonging to this king (Pl. I, figs. 24, 25, 26). I ascribe these three to Rezia. The *Rukn* is unmistakeable in my coin. I give in No. 4 a drawing of a coin I have, which is exactly like one of Thomas' (No. 24). A careful study of it will at once show that it reads Obv. "*Us sultán al Muazzim Rezia ud Dunyá wa ud Dín*." Rev. Horseman and steed, exactly like Thomas'. In my coin the *zwád* (ض) is more fully developed and it must be a coin of Rezia's.

In Pandit Ratan Narain's list of coins I find a rupee of *Rukn ud Dín Fíroz Sháh's*. Obv. *As sultán ul 'Azim Shams ud Dunyá wa 'd Dín, abú 'l Muzaqqar Rukn ud Dunyá wa 'd Dín Fíroz Sháh*. Rev. *Fí ahd il Imám Al Mustansir, Amír ul Mominín, fí shahúr i san thaláth wa thaláthín wa sita mi'ata*. In this rupee the letters of *Rukn* are exactly as in my coin. It has no margins, the date is given in the square area. This rupee is quite unique. I should very much like to know its whereabouts. Such a coin should by no means leave the country. I may add that Ratan Narain gives in his list a copper coin like mine, and, being misled by Thomas, gives also two of Rezia's coins as *Rukn ud Dín's*. I have four coins of Rezia's of this kind, as well as four of the type I published in my last paper, and one each of Thomas' Pl. I, figs. 28 and 29. On comparing them I have no hesitation whatever in assigning Thomas' Pl. I, Nos. 24, 25, 26 to Rezia.

In my last paper I gave a coin of Sanjar and Bahrám Sháh. In it the title of *Muazzim* was given to Sanjar. In my present paper I give coins which shew that this title was given to several kings, who rejoiced however, as is shown by their numerous coins, in the title *al Azim*.

No. 5. Obv. "*As sultán ul Muazzim, Alá ud Dunyá wa 'd Dín*." Rev. Horseman and steed.

No. 9. Obv. *As sultán ul Muazzim Eltatamsh as Sultán*. Rev. Horseman and steed and remains in Hindi of *Srí Hamírah*.

Plate II, No. 2. Rev. *Us sultán ul Muazzim.*

Obv. *Gyás ud Dunyá wa ud Dín.*

In these three coins Alá ud Dín (Masaud Sháh) and Shams ud Dín Altamsh and Gyás ud Dín (Balban) we have the title *Muazzim*. And it comes also in No. 6 which I now proceed to describe.

No. 6. Obv. in florid Kufic "*As sultán ul Muazzim Shams ud dunyá wa 'd dín Abú 'l Muza'ffar (Eltamash?)*". Rev., in a rayed circle, the Kalimah, under which (*Al Mustansir*) *biamri 'llah Amír ul Mominín*. This coin weighs 62 grs. only. It is therefore a tankah. It came to hand with three *Bahá ud Dín Sám's* silver tankahs.

No. 7. A rupee of Shams ud Dín Altamsh.

Obv. "*As Sultán ul Azim Shams ud Dunyá wa 'd Dín Altamsh as Sultán Násir i Amír ul Mominín*." Rev. *Fi ahd il Imám Al Mustansir Amír ul Mominín*. Margin illegible alas!

No. 8. Obv. in Hindí above bull, *Samasa Dín*.

Rev. above horse *Ha* and no other letter of *Hamírah*.

This type is quite new.

No. 10. Obv. *As Sultán ul Azim Shams ud Dunyá wa 'd Dín*.

Rev. Horseman, to right of which *Eltatamsh*, and above horseman *us Sultán*. Thomas' coin had not any inscription in front of the horse. I have seen several of this type.

No. 11. Obv. (*Shams*) *ud Dunyá wa (ud Dín) Elttatamsh as Sultán*.

Rev. Horseman and *Srí Hamírah*.

No. 12. Obv. *As sultán ul 'Azim Elttatamsh as sultán*.

Rev. Horseman at charge.

No. 13. Obv. *Shams ud Dunyá wa 'd Dín Abú 'l Muza'ffar us Sultán*.

Reverse, not given.

These three coins Nos. 11, 12 and 13 give more than do Thomas' Nos. 47, 46, and 48. A comparison of them with Thomas' coins will at once show the additional information these supply.

No. 14. This is the same as Thomas' No. 50, with the addition of the word *as Sultán* on the obverse plainly visible.

Nos 15, 16, 17, 18 show at one view four types of coins of Elduz, the general of Muhammad bin Sám. Three of them are binominal.

No. 15. Obv. *Muizz ud Dunyá wa 'd Dín, Abd Yalduz*.

Rev. Bull over which "*Srí Muj*," in Hindí.

There cannot be much doubt about the reading of the Hindí. *Srí Hamírah* it cannot be. It is an attempt I think by a Musalmán at *Srí Muizz*.

No. 16. Obv. *Muizz ud Dunyá wa 'd Dín*.

Rev. *Abd Yalduz*.

There are floral ornaments about the inscriptions.

No. 17. A similar coin to *Ariana Antiqua*, Pl. XX, fig. 18, but much fuller.

Obv. "*As Sultán ul Azim Muizz ud Dunyá wa 'd Dín.*"

Rev. '*Abdu 'l Malik ul Muazzim, Tij ud Dunyá wa 'd Dín Yalduz.*

No. 18. Obv. "*As sultán ul Muazzim Abú 'l Fath Yalduz as Sultán.*

Rev. Horseman with remnants of *Srí Hamírah* and Star underneath horse.

Plate II. No. I. Gold Mohur of Sher Sháh. Obv. in Mahrábí area "*As Sultán Sher Sháh, khallad Allah Mulkahu.*" Rev., in square area, the Kalimah. Both margins are illegible: this is a great pity, as the coin is in every other respect one of great beauty.

No. 3. Obv.—"*Sultán Sher Sháh, zarb i Sambhal.*" Margin obliterated. Rev. not given.

No. 4. Obv.—"*Sultán Sher Sháh, zarb i Alwar.*"

These are two new mints of Sher Sháh.

No. 5. Rupee of Sher Sháh. Circular areas on both sides. Obv. "*Sher Sháh Sultán, khallad Allah &c.*

Margin:—" *Furíd ud Dunyá wa 'd Dín abú 'l Muzaffar*" and in Hindí, *Sher Sháh*, and in Arabic figures 949. Rev. the Kalimah: Margin, the names of the four companions: and "*As Sultán ul Adil, zarb Ujain.*" This is also a new mint of Sher Sháh's.

No. 6. Rupee of Sher Sháh's: Square areas surrounded by double lines.

Obv. *Sher Sháh Sultán, khallad Allah mulkahu.*" Margin "*Furíd ud Dunyá wa 'd Dín, zarb i Shergarh,* in Hindí "*Sher Sháhi.*"

Rev., kalimah in area. Margin, the names of the four companions and their titles. This coin has not been figured before. Unfortunately mine has lost a piece out of its centre and it has not been mended very cleverly. But the workmanship is very superior.

No. 7. Rupee of Kutub ud Dín Mubárah Sháh. New type.

Obverse: "*Al Imám ul Azim, Kutub ud Dunyá wa 'd Dín, Abú 'l Muzaffar, Khakífatu'lláh.*"

Rev. central area: "*Mubárah Sháh as Sultán, ibn us Sultán Al Wásiq billah, Amír ul Mominín.*"

Margin.—"*Zarb házú il Pizzat bi Hazrat dár il Khiláfat, Fl sanat, saba ashrata wa saba miáta.*

This coin has on it exactly the same as Thomas' No. 146. But his is a square piece. On Mr. Delmerick's coin are similar inscriptions, with the mint place however termed "*dár ul mulk,*" not "*dár ul khiláfat.*"

No. 8. Gold coin of Gyás ud Dín Tuglaq. This coin is the same as Thomas' No. 158. In his coin the margin stops short when it gets to the mint. This goes on three words "*fi mulk i Talang.*" It was struck in Telingana.

No. 9. A gold mohur. Rev. *Mahmúd Sháh, bin Muhammad Sháh bin Tuglaq Sháh as Sultán 752.*"

Obv. *Fi zaman i Amír ul Mominín, Gyás ud Dunyá wa 'd Dín, Abú 'l Muzaffar.*"

When Muhammad Tuglaq died, Fíroz Sháh was with him at Tatta in Scinde. Ahmad Ayáz Khwájah i Jahán set up in Delhi a boy of six years of age as king. Ferishta says that he was called Gyás ud Dín *Muhammad*, but the coin shows that his name was *Mahmúd*. On Fíroz Sháh's arrival in Delhi Mahmúd was deposed.

No. 10. New type of Alá ud Dín Khwárizmí's coin struck at *Kishm*. Obv. "*Kishm, Ala ud Dunya wa 'd Dín, Muhammad bin us Sultán.*" Rev. horseman by side of spear "*(A)mír.*" Above the horse "*ul Azim.*"

No. 11. Obv. "*(Saif) ul dunyá wa 'd Dín, Abú ul Muzaffar, al Hasn, bin Muhammad.*"

Rev. Bull on which "*Kirmán,*" over it in Hindí *Srí H?*"

No. 12. Obv. "*Násir ud dunyá wa 'd Dín, Abú 'l Muzaffar.*"

Rev. "*Muhammad bin Hasn Karlagh.*"

No. 13. Obv. in Hindí round a bull "*Srí Jalál ul Dín.*" On the bull in Arabic "*Kirmán.*"

Rev. Horseman over which words which may be Hindí "*Srí Hamírah,* but they look like Persian "*Farmán rawd.*"

These last four coins are all new types. *Kirmán*\* may be the Persian province and town. Jalál ud Dín Khwárizmí went there by way of *Mekrán* after he left India. At least so says the author of the "*Rauzat us Safa.*"

No. 14. Obv. "*Khalífatu Rabb il Alámin Kutub ud Dunyá wa 'd Dín.*"

Rev. "*Abú 'l Muzaffar Mubárah Sháh as Sultán ibn us Sultán Al wásiq billah.*"

No. 15. Obv. "*Al Mujáhid fi sabíl i 'llah Muhammad Tuglaq.*" Above, "*Abubakr;*" to right, "*Alí;*" to left "*Umr*" under "*Óthmán.*"

Rev. the Kalimah in a circle. Margin: "*Zarb házá us Sikka, bi Hazrat Dohli, fi sanat Khams asharín wa saba miata.*" This coin is a very

Thomas identifies it with *Kurram* near Bunnú. *Kishm* is I suppose the island known at the entrance to the Persian Gulf. If so, there is no reason why *Kirmán* may be the Persian one, except this one, that here we have coins struck in Hindí.

much better specimen than the one given in Thomas which was struck in *Dār ul Islām*." Thomas calls his *unique*, but I have one also struck at "Dār ul Islām," and during the last five years I have seen about half a dozen of them. *Dehli* and *Dār ul Islām* were favourite mints of Muhammad Tuglaq, but I have coins of the type of No. 159 in Thomas that were struck at not only these two places, but at "*Takhtgāh i Dehli*," "*Arsa i Satgāwn*," and at "*Iqlīm i Tuglaqpūr urf* (known = *i. e.*) *Tirhut*." There are coins extant which were struck at *Daulatābād*. Thus there were six mints of this one type of coins. The simply *Dehli* marked coins and the *Tuglaqpūr* and *Satgāwn* types have not yet been published. Thomas' No. 173 was struck at Dehli. The Lahore Museum possesses three similar gold mohurs. Of these, two were struck in 734 and one in 735 and all at *Satgāwn* in Bengal.

In Sir Alexander Burnes' "*Travels in Bukhara*" Vol. II, two plates of coins are given. This book was printed in 1834. Masson's researches in Afghanistan produced over 60,000 coins. From them Wilson compiled the *Ariana Antiqua* which contains 21 plates of coins, Grecian, Greco-Bactrian, Indo-Scythian, Sassanian and Indian. General Cunningham in his "*Coins of the Successors of Alexander in the East*" gives fourteen plates which deal only with Grecian and Greco-Bactrian coins. Late discoveries have produced so many new coins that a supplement equal in size to the original book might easily be published. The coins of each dynasty that has reigned in India supply matter enough for a volume. These coins are purchased by private individuals and of course kept in their cabinets, each new type being hailed with numismatic delight. When these private individuals go home, of course they take their acquisitions with them. So that private enterprise in Indian numismatics simply robs the country of its treasures. When a poor student wishes to see the coins about which he reads, he cannot do it. The museums have not got them. The Calcutta Museum is I am credibly informed destitute of coins. It seems to me there is only one way of meeting this difficulty. The Museums of India must have grants made to them for the purchase of coins just the same as Museums at home have. The Berlin museum gets everything good in Europe, simply because it gives good prices. Here in India those who can pay get the best coins. And if the Government of India desires that the museums should possess cabinets of coins, men must be appointed and money granted, or nothing will ever be done except opportunities lost.

I have shown above how our knowledge of the different kinds of coins has increased. What I desire to see is an increase in the number of coins in our museums.

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